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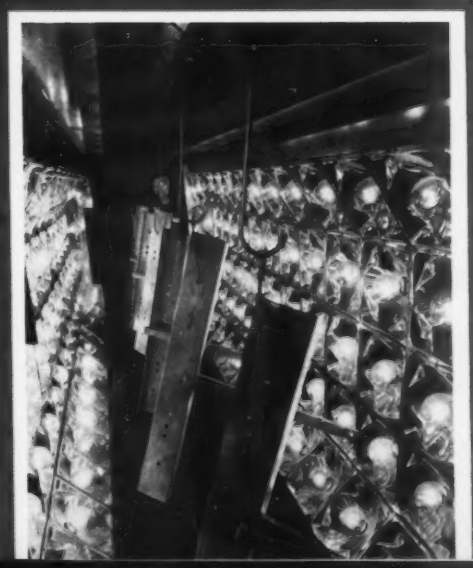

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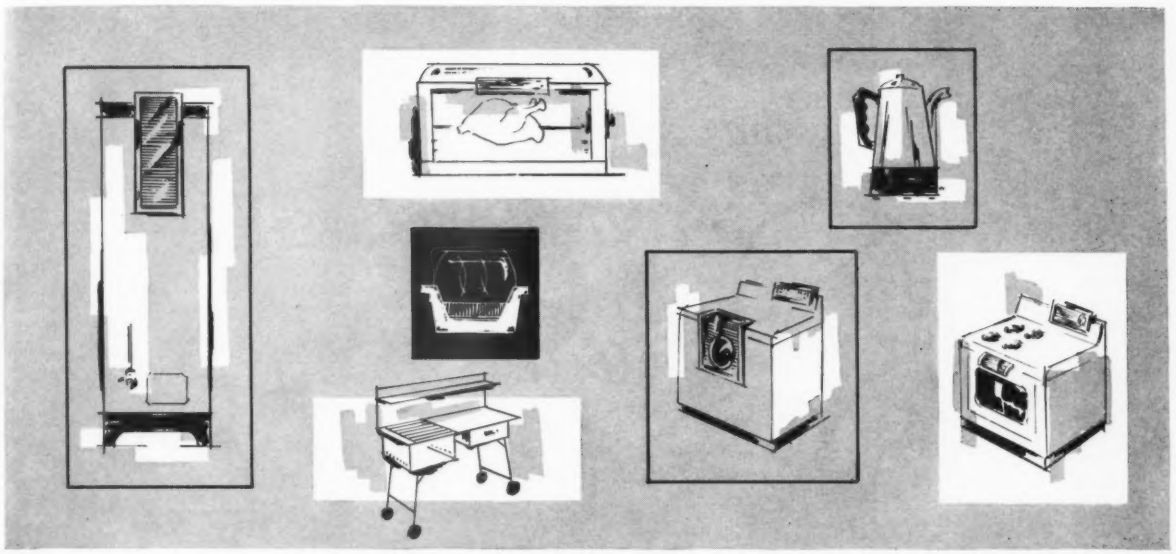

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MONTHLY TRADE PUBLICATION
Established January 1944
Published by
DANA CHASE PUBLICATIONS
York Street at Park Avenue, Elmhurst, Illinois
Telephones • TErrace 4-5280 • TErrace 4-5281

NBP BPA

FEBRUARY • 1958

VOL. 15 • NO. 2

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Editor and publisher • DANA CHASE
Technical Editor • JOHN SINCERE
Associate Editor • WM. N. LARSEN
Western Editor • GILBERT C. CLOSE
Mgr., Customer Service • DANA CHASE, JR.
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Accepted under the act of June 5, 1934 at Aurora, Illinois authorized January 7, 1948.

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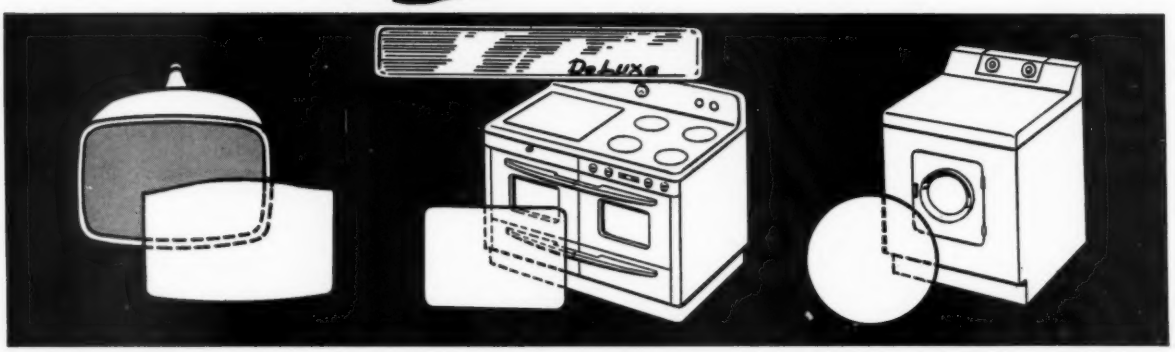

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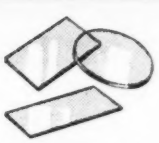
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Can one cleaning material do all metal-cleaning jobs? *See page* 5.

What kind of cleaner attracts both oil and water? How does this help remove buffing compound residues and pigmented drawing compounds? *See page 8.*

Why clean ferrous and nonferrous metals in separate tanks? *See page* 10.

What are the advantages of reverse current for electrocleaning steel? *See page 15.*

For electrocleaning nonferrous metals, what are relative advantages of cathodic, cathodic-anodic and soak-anodic cleaning? *See page* 17.

Can you electroclean brass without tarnishing? *See page 18.*

How do bright dips make metals brighter? *See page* 21.

Can you clean steel and condition it for painting for less than 20 cents per 1,000 square feet? *See page 24.*

Would you like a cleaner that removes rust and oil at the same time; often eliminating all need for pickling? *See page* 28.

What's the best way to clean parts that are too large to be soaked in tanks or conveyed through washing machines? *See page 30.*

Does your burnishing barrel produce a luster you are proud of? *See page* 32.

What do you do when the overspray neither sinks nor floats in the wash water in your paint spray booth? *See page 35.*

Do you dry steel parts before anti-rusting? *See page* 37.

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INDUSTRY MEETINGS

ELECTRICAL ENGINEERS

American Institute of Electrical Engineers' Winter General Meeting, Hotel Statler, New York City, February 2-7, 1958.

REINFORCED PLASTICS

13th Annual Technical and Management Conference, Reinforced Plastics Division, Society of the Plastics Industry, Inc., Edgewater Beach Hotel, Chicago, February 4-6, 1958.

ELECTRICAL MANUFACTURERS

National Electrical Manufacturers' Association, Edgewater Beach Hotel, Chicago, Ill., March 10-13, 1958.

OFFICE FURNITURE

12th Annual Convention and Exhibit of the National Office Furniture Assn., Convention Hall, Philadelphia, Pa., March 28-31, 1958.

GAS APPLIANCES

Gas Appliance Manufacturers' Association's Annual Meeting, The Greenbrier, White Sulphur Springs, W. Va., March 31-April 2, 1958.

TECHNICAL MEETING

American Welding Society's Annual Technical Meeting, Hotel Statler, St. Louis, Mo., April 14-18, 1958.

WELDING SOCIETY

American Welding Society's Annual Welding Show, Kiel Auditorium, St. Louis, Mo., April 15-17, 1958.

METAL MANUFACTURERS

National Association of Architectural Metal Manufacturers' 20th Annual Convention, Shamrock-Hilton Hotel, Houston, Texas, April 27-May 2, 1958.

TOOL ENGINEERS

American Society of Tool Engineer's 26th Annual Meeting & Tool Show, Philadelphia Convention Center, Philadelphia, Pa., May 1-8, 1958.

AIR CONDITIONING

Air-Conditioning & Refrigeration Institute's Annual Meeting, The Homestead, Hot Springs, Va., May 4-7, 1958.

PORCELAIN ENAMEL

Porcelain Enamel Institute's Mid-Year Divisional Conference, Edgewater Beach Hotel, Chicago, Ill., May 13-14, 1958.

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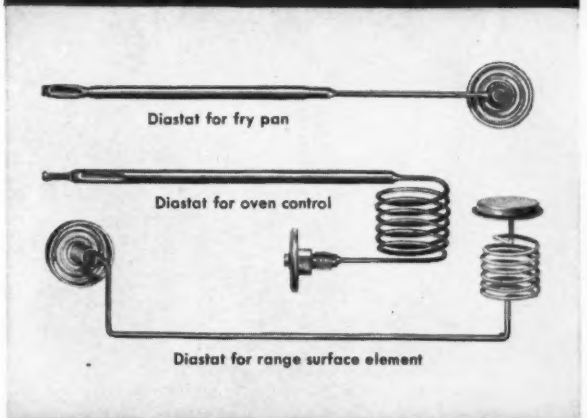

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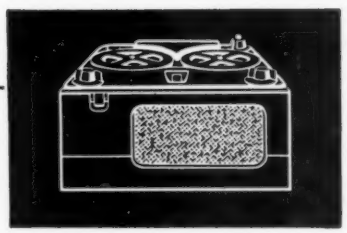
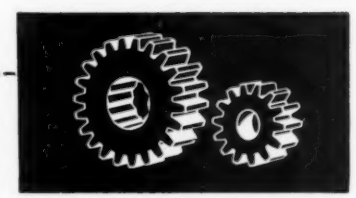
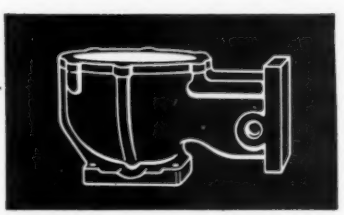


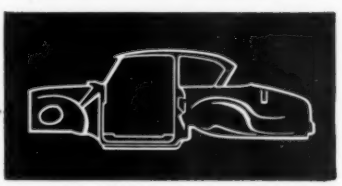
GEARS, cut, ground and tempered, are treated with Blucoat to prevent rust during storage, shipping, and assembly.



CARBURETOR bodies and large engine castings being treated with Macco Blucoat to prevent rust after machining and during storage.



AUTO bodies of some of the world's largest body manufacturers are given the Blucoat treatment to prevent rust after drawing or machining.



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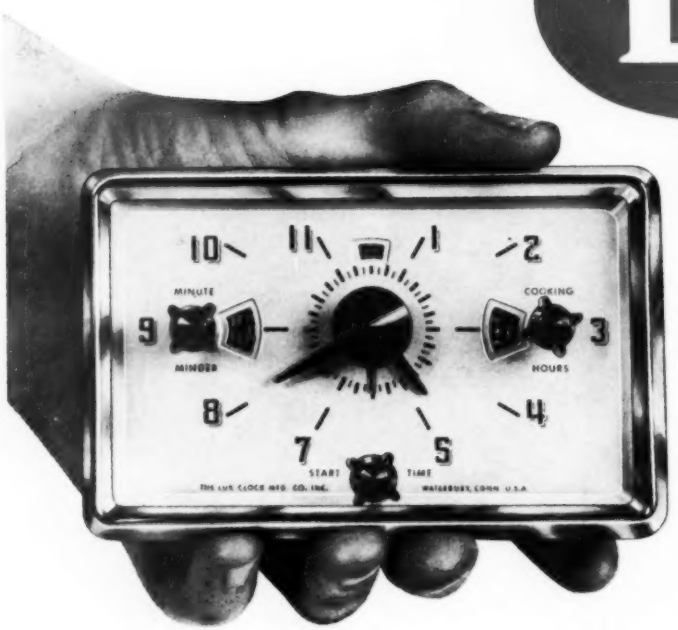

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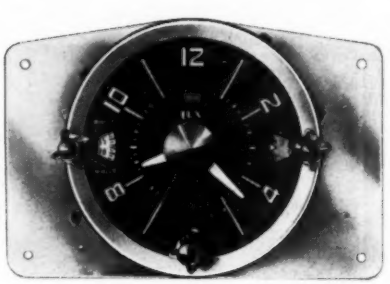

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Chemical Prepaint Treatments for Metal Surfaces

What they do, the types available, how they are applied

By J. H. GEYER
Manager, Product Development Dept.,
AMERICAN CHEMICAL PAINT COMPANY

Paint systems have been steadily improved in an effort to produce more decorative, easier-to-apply, and more corrosion-resistant films. The ability, however, of any paint film to perform its predetermined functions cannot be fully utilized without properly preparing the metal surface.

The prepaint preparation of the metal surface is therefore a highly important part of the system. Chemical prepaint treatments are designed to do four jobs and do them well. First, they remove organic soils, shop dirt, scale, and rust or corrosion products from the metal surface. Second, they provide surfaces that are completely compatible with subsequent paint films. Third, they produce a *tooth* that promotes good paint film adhesion. Fourth, they effectively prevent underpaint corrosion growth after any breakthrough in the paint film.

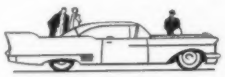
Basically, there are four types of chemical prepaint treatments. These are phosphoric acid, iron phosphate, zinc phosphate, and amorphous phosphate or chromate. Each is discussed briefly in the following paragraphs.

Phosphoric Acid

Perhaps the most widely used and certainly one of the most economical chemical prepaint treatments is the phosphoric acid cleaner combination materials. ACP Deoxidine® is such a material. It removes organic soils, rust, scale and contaminating elements from the metal surface. It also produces a light etch on steel, aluminum or zinc surfaces which considerably aids in increasing paint adhesion. It does not, however, form an actual coating on the metal surface. Any breakthrough in the subsequent paint film will permit underfilm corrosion to proceed. Grades of Deoxidine are available for application by brush or swab, hot and cold dip, or hot spray.

Iron Phosphate

Iron phosphating processes are extensively used in the chemical prepaint treatment of appliances such as water heater shells, ranges, washers, dryers and other *white lines*. These processes will produce excellent paint-bonding films on the metal and retard or prevent underpaint corrosion. Duridine,® ACP's iron phosphating process, is a combination organic soil cleaner and iron phosphate coating material. Both the cleaning and coating operations take place in the same bath. Duridine and other iron phosphates do not lend themselves to brush-on application, are primarily designed for spray type equipment of four or five stages. But several dip installations are successfully operating today by inclusion of an alkali precleaning stage.



Zinc Phosphate

ACP Granodine® is an example of this type of chemical prepaint treatment process, the type now being used to treat steel in the automotive industry, and predominantly specified for steel ordnance and military items. This process forms a coating which offers the ultimate in paint adhesion promotion and vastly augments the corrosion resistance of subsequent paint films. Zinc phosphate materials are extremely flexible as to method of application—can be applied by brush, dip or automatic spray equipment. In a typical dip or power spray system, the stages would be alkali clean, water rinse, zinc phosphate treatment, water rinse, and acidulated final rinse. If the metal has considerable areas of rust or scale, an acid pickle is advisable following the alkali cleaning stage.

On zinc surfaces, the zinc phosphates perform a rather unique function. They act as a barrier against chemical reaction between the applied paint film and the zinc surface. This effectively prevents blistering of the paint and early breakdown of the film. This is in addition, of course, to the improvement of paint adhesion and the retarding of underpaint corrosion. ACP Lithoform® is specially designed for use over zinc surfaces and finds wide application as a prepaint treatment for ornamental zinc die castings, refrigerator liners, and on most galvanized work requiring painted finishes.

Amorphous Phosphate and Chromate

These coatings are the films produced by the ACP Alodine processes and similar ones on aluminum surfaces. They have met with wide acceptance in the prepaint treatment of venetian blind strips, refrigerator liners, aluminum heat transfer units, aircraft sheet metal assemblies, and many other items fabricated from aluminum. The various coatings provide an excellent film for the promotion of paint adhesion and effectively prevent underfilm corrosion. As in the case of zinc, aluminum exhibits a tendency to chemically react with some paint systems. The Alodine processes develop a barrier film between the paint and the aluminum surfaces which prevents this reaction. The Alodines are extremely versatile materials that can be applied to aluminum surfaces by brush, hand spray, dipping, mechanical spraying, or roller coating equipment. Brush application is particularly well adapted to the processing of parts too large for simple dip systems or in manufacturing operations that do not warrant a tank setup. In dip, spray or roller coating application, the system usually consists of an alkaline preclean, a water rinse, the Alodine treatment, a water rinse, and an acidulated final rinse. Where the surface is heavily oxidized, a deoxidizer in the line is needed.

The major chemical prepaint treatments for metals have been covered briefly in this article. More complete information can be had by contacting an ACP sales representative or by writing us at Ambler, Pa.

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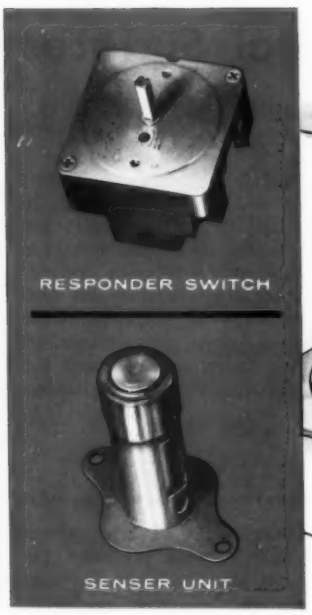

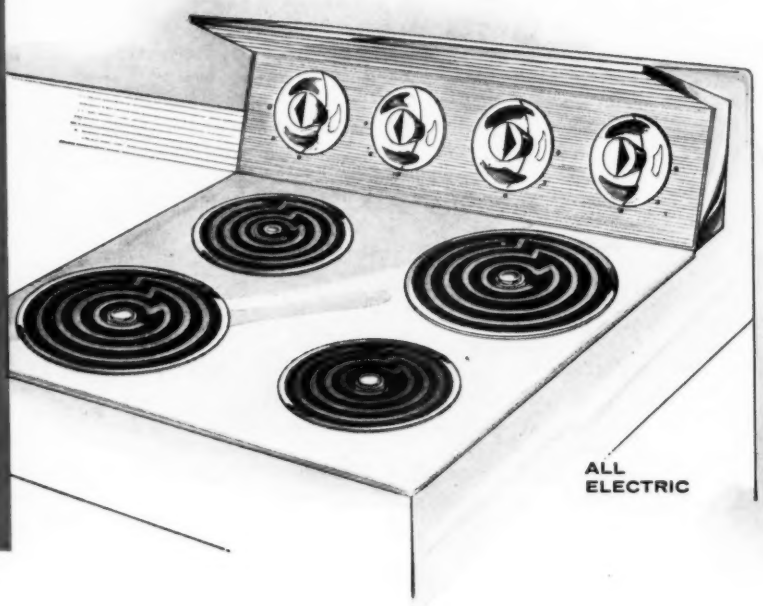

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- Single unit can control any wattage element up to 3500 watts, including split coil types
- All units completely interchangeable
- Reduces inventory and installation problems
- User safety assured by low voltage system between senser and responder switch.
- Only one transformer for any number of surface units
- Rugged senser—withstands up to 800°F
- Automatically reduces wattage when cooking utensil is taken off surface element

8001

Write for detailed specifications and costs

KS KING-SEELEY CORPORATION ANN ARBOR, MICHIGAN

THE finish LINE

READERS OF MPM **. . . . .** will note a change in our cover design and some slight changes in format for this issue, which represents the first birthday of the name METAL PRODUCTS MANUFACTURING. It was not intended that there should be anything revolutionary in the changes made. As a matter of fact they represent a continuation of the *evolution* in cover design, format, and editorial content which has gradually taken place since the first issue was published, as "finish", in January, 1944.

When this publication made its bow to the manufacturers of metal products in 1944 the editorial concept was narrower in scope than it is today. Even in the first issue, however, there were indications of the broad services intended for the manufacturers of appliances and other fabricated metal products. For example, there was a feature on "*The kitchen of the future*" as contrasted to the *All white kitchen,* by Mary Davis Gillies, the interior decorating editor of *Mc Call's Magazine.* Included was a feature on a leading range manufacturer's plant facilities; there was information on fabricating, finishing and an editorial and photographic report on a major appliances industry meeting.

Complete editorial service inaugurated

Beginning in 1949, it became publication policy to offer a "*complete editorial service*" to the producers of fabricated sheet metal products. While the home appliance industry was, and continues to be, the center of editorial interest, it has always been the opinion of our editors that many of the problems of management, engineering and plant operations, discussed by metal industry leaders in MPM, are of equal interest to the producers of many products. Therefore, our circulation coverage and editorial scope were both planned to include the manufacturers of the following products:

Appliances: air conditioners . . air coolers . . evaporators . . air heaters . . gas conversion burners . . oil burners . . coffee makers . . dehumidifiers . . dishwashers . . laundry dryers . . fans . . food waste disposers . . freezers . . furnaces . . grills and waffle irons . . hot plates . . ironing machines . . irons . . radios . . ranges (all types) . . range boilers . . refrigerators . . roasters . . storage water heaters . . room heaters . . television . . toasters . . vacuum cleaners . . washing machines . . water coolers . . other small appliances, such as blenders, deep fryers, etc.

Other fabricated metal products include: automotive . . business machines . . commercial display cases . . commercial freezers . . metal furniture . . holloware (cooking) . . hospital ware . . plumbing ware . . commercial refrigerators . . shower stalls . . production quantity metal signs . . soda fountains . . steel containers . . steel kitchen cabinets . . storage tanks.

Also included are the large production fabricating plants which build components for the end product manufacturers. Leading design engineering firms are included too.

An editorial challenge

Due to the broad group of products covered, plus an editorial plan for including material in each issue of interest to top management, engineering and key plant management and supervision, the responsibility of balancing editorial content becomes a definite challenge to the editorial staff.

One method of meeting this challenge is to carry a much higher percentage of editorial content (in relation to advertising) than is customary in the industrial trade publication field. In addition to the higher percentage of editorial pages, the "oversize" format of wider paragraphs and longer columns are all a part of this definite plan to offer a complete editorial service to the fabricated metal products field.

Except for news and material of a strictly current nature, editorial plans for MPM are made several months in advance in order to maintain as perfect a balance as possible of the editorial material to be offered during the year. We hope to make 1958, the 15th year of publication, and the second year under the MPM banner, our year of greatest service to our readers. While a few features will be highlighted on MPM covers, we urge study of the editorial index on page 3 of each issue, for during the coming months there will be important information for everyone in the industry we serve, whether the reader is a representative of management, engineering, purchasing or plant operations.

We are happy to say that our letters to the editor continue to increase in volume. Our editors value these letters as a source of constructive criticism, comments, and suggestions. In closing this brief review, we want to issue an invitation to all readers to participate in our editorial service by mailing comments, suggestions or criticism that it is felt may be helpful to our editors in planning future issues.

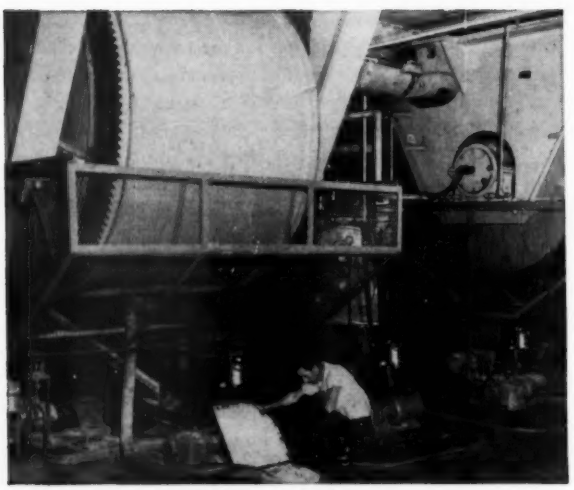
Dana Chase

EDITOR AND PUBLISHER

FOR DeSoto
PAINT AND VARNISH
COMPANY

BASIC PRODUCTION IMPROVEMENTS

with ARLCITE HIGH DENSITY



MILL LINING BLOCKS AND GRINDING BALLS

Production notably increased—balls and lining life greatly extended—cleaner color and higher gloss—no contamination. So reports DeSoto from their Garland, Texas plant, with pebble mills equipped 100% with ARLCITE linings and ball charges. Record-making high density ARLCITE balls and blocks permit higher paste viscosities (more volume of finished product per volume of base). Use of smaller diameter balls notably reduces grinding time. For greater production flexibility, *let us quote ARLCITE for your requirements.*

ADVANCED
PROCESS EQUIPMENT
OF ENDURING SATISFACTION

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A Subsidiary of Ferro Corporation
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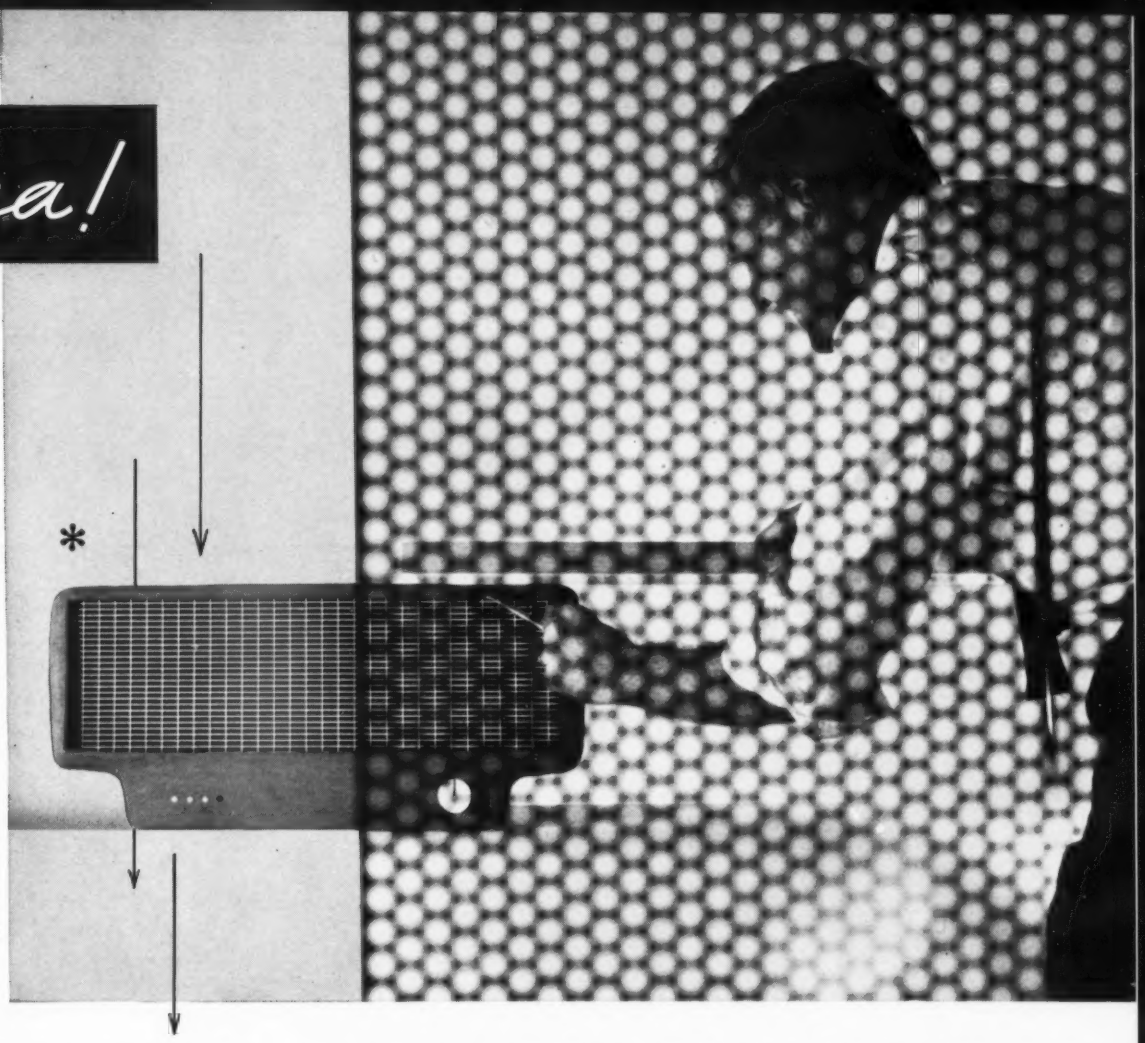
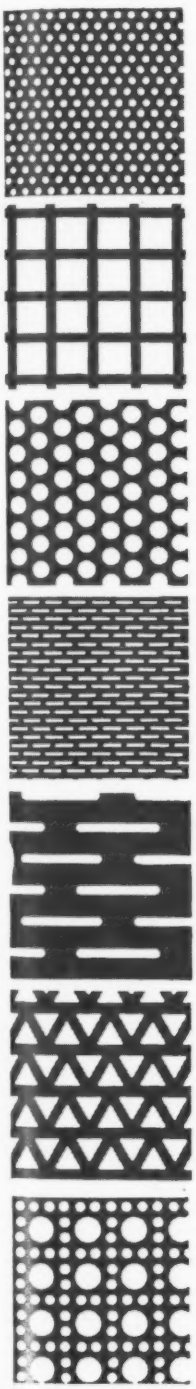
Idea!





A few of the many H & K Patterns available.

mock-up projects design with H&K perforated metals

Here you see an actual H & K perforated metal grille utilized in a mock-up of a record player. This greatly helps the Industrial Designer project his concepts as H & K perforated metal is now in its proper element for consideration of use and selection of pattern.

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H & K perforated metals provide the Industrial Designer, and other men of ideas, a medium of unlimited opportunities for designing better and more attractive products.

H & K sales engineers will be pleased to work with you on your perforating requirements.

The design, pattern and open area for almost every application may be selected from our thousands of perforating dies . . . at no charge for tooling. (If a special design is required, tools will be built to order.)

Harrington & King can perforate practically any material that can be obtained in coils, sheets or plates . . . from foil-thin to 1" thick. Metallic materials—steel, aluminum, stainless steel, brass, copper, monel, zinc, bronze, etc. Non-metallic materials—plastics, wood composition, paper, cloth, etc.

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*Product Development by William M. Schmidt Associates.

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☐ GENERAL CATALOG
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THE MPM spotlight

Functional angular styling and revolutionary conveniences are features of the 1958 Norge refrigerator. Removable Swing 'n Serve shelves swing completely clear of the interior at the touch of a finger. With a shelf spacer, fully-loaded shelves may be raised or lowered to new levels for more convenient food storage. Ice cubes cease being a problem with automatic Handi-Cube ice service. Freezing, releasing from trays, and storing in an ice bin is done automatically.

At Westinghouse, production men agree on economy of Wean coil processing

Mr. M. W. Stretch, right, of the Manufacturing Planning Department, and his assistant, Mr. M. Avery, discuss Wean's slitting line "after hours."

Until recently, the Electric Appliance Division plant of Westinghouse Electric at Columbus, Ohio was supplying its production lines with steel purchased in sheet form and individually resquared. Some 75 sheet sizes had to be stocked to meet varying requirements.

The installation of Wean slitting and shearing lines in August, 1957 was made after a careful cost analysis of this production process. Now, after five months operating experience, here is how production management at this Westinghouse plant summarizes the advantages of the Wean coil processing system:

Materials Savings: in addition to the initial savings realized by the purchase of coil rather than sheet, scrap is reduced by the close control and accuracy possible on Wean slitting and shearing equipment. Coil is slit in a variety of widths, from 3 to 48 inches, to supply both the shearing line and press lines, now being coil-fed.

Inventory Savings: 3 or 4 standard coil sizes now provide the production flexibility for which 75 sizes of mill-prepared sheet were previously required. In addition, prime plant space for sheet production and storage has been reduced and inventory turnover increased.

Low-Cost Versatility: differing assembly line requirements for sheet are now met quickly and easily, without production delay or the expense of special purchases.

The mechanized handling of metal possible with the Wean slitting and shearing lines also has reduced direct labor costs, freeing men for work in other production departments. And the production rate of the Wean system is more than adequate to match the plant's usage of coil and sheet: in one three-day period, 350 tons of coil were processed on the shearing line.

If you use sheet steel in quantity, it's likely that these same savings could result from your plant's use of Wean slitting and shearing equipment. One of our experienced sales engineers will be glad to explore with you the economics of processing from coil to fill your production requirements. May we hear from you?

WEAN

WEAN EQUIPMENT CORPORATION

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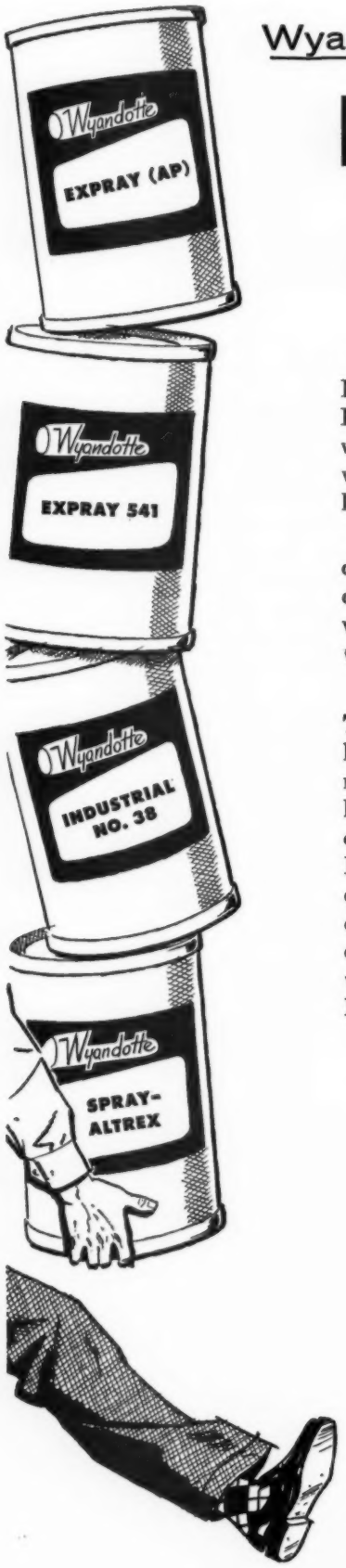

Wyandotte spray cleaners

keep parts clean, every step of the way!

Rust-inhibiting EXPRAY (AP)

For hot or cold use on all metals. Low, controlled foaming in all washers. Prevents rust; non-scaling with any water; works even with heavy soil loads.

EXPRAY (AP) is excellent for chip, grinding dust, and fabricating-oil removal in one-stage washers. Works well in multi-stage washers, too.

Low-foaming EXPRAY 541

This Wyandotte spray cleaner is highly silicated to provide built-in maximum detergency — removes heavy drawing compounds, buffing compounds, and machining oils. It is designed for use on all metals except aluminum; built for heavy-duty use with heavy soil loads; can be used in highest pressure washers without foam problems. Non-dusty, easy-to-handle.

Heavy-duty INDUSTRIAL No. 38

For heavy-duty spray washing, Wyandotte offers INDUSTRIAL No. 38. This free-rinsing, alkaline cleaner is essentially anhydrous — all cleaner. No built-in water.

Heavy-duty Industrial No. 38 has been an industry standard for years, unexcelled for handling those tough jobs on steel, brass, and zinc die castings.

New SPRAY-ALTREX

The newest and best spray cleaner for aluminum. Removes all aluminum soils, including stencil ink, without etching. Low foaming at all temperatures in all washers. For hot or cold use. A non-dusty product which gives excellent performance, even under the most adverse conditions.

Get free information today!

Wyandotte has custom-designed these cleaners to meet the problems encountered in spray cleaning between machining operations, and other special applications. To get details on how they can solve your particular spray-cleaning problems, contact your Wyandotte man, today. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

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THE BEST IN CHEMICAL PRODUCTS FOR METAL FINISHING

How to fabricate stainless steels

covers fabrication of various grades, good die practice, die lubricants, annealing, roll forming, spinning, cutting and shearing

by W. E. McFee • SUPERVISOR, PRODUCT INFORMATION SERVICE, ARMCO STEEL CORPORATION

PART TWO: SPINNING

MPM EXCLUSIVE FEATURE

STAINLESS STEELS are spun on lathes used for mild steel but, because of their greater strength, more power input is necessary. Motor horsepower may vary from about 5 to 30 or more, depending on size and nature of the work.

Spinning speeds are slower than for mild steel because of the high work-hardening rates of chromium-nickel stainless steels.

Actual speeds are governed largely by "feel" and experience; also by gage and diameter and the severity of the job. The accompanying tabulation (Chart 3) can be used as a guide, indicating the wide variations in required operating speeds.

The higher peripheral speeds are used to work 18 gage and lighter. Slower speeds will leave tool marks. Middle to lower part of the range is generally for No. 16 gage and heavier.

Only slight changes from mild steel practice are necessary to spin the chromium types such as Types 410 and 430. These alloys fall between the chromium-nickel types and mild steel in hardness and strength. Their lower elongation permits less working before annealing; yet their low work-hardening rate tends to permit more. Spinning speeds are about two-thirds of those used for ordinary spinning steels, and faster than for the chromium-nickel types.

Maple is the preferred material for spinning blocks or work patterns mounted on the lathe spindle; also for follower blocks attached to the tailstock.

Generally it is not possible to duplicate shapes in stainless steels with patterns used for the spinning of softer metals. Greater springback, particularly with the chromium-nickel grades, is the reason. Patterns for spinning stainless steel should be more deeply contoured than for mild steel.

Some parts require several spinning operations to produce the finished contour. Separate spinning blocks are used for the various operations, and proper design is important.

The approximate blank diameter for the piece may be calculated but its exact dimensions must be arrived at by trial. First, measure the length along the outer boundary of the cross-section of the part to be made. Then deduct 5 to 10 per cent to allow for metal-stretch in spinning. Cut one blank this size and spin it. If too much metal extends beyond the point where the edge should be, cut down blank size accordingly to avoid excessive trimming loss. Repeat this procedure if necessary before cutting any quantity of blanks. Always start with blank size slightly larger than required to allow for downward adjustment in size. Allow enough metal for edge trimming when determining final blank size.

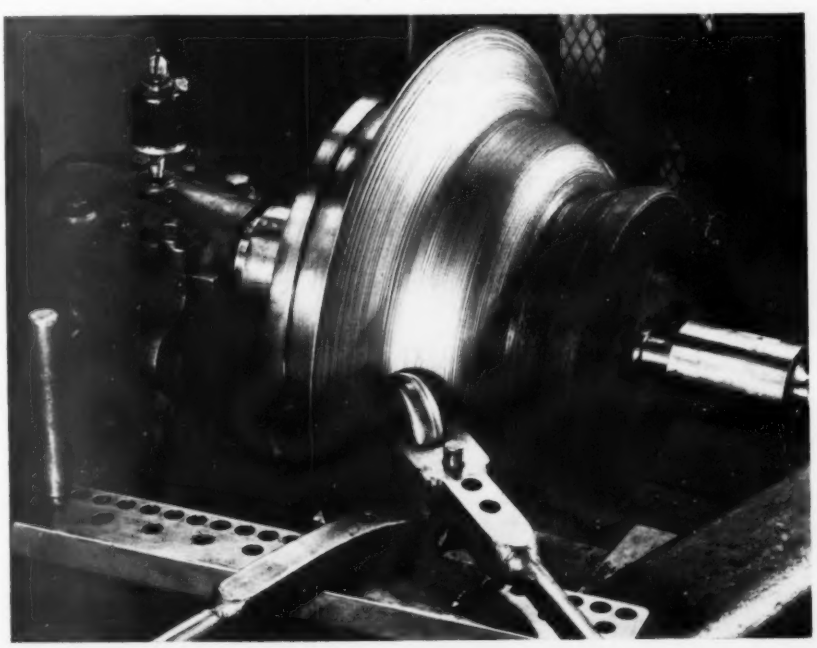
Light work may be done with single bar tools having stationary tool tips. Heavier work requires double-lever or power-driven tool rests with rollers. Both tool tips and rollers should be contoured slightly flatter than for mild steel or copper practice to offer a greater bearing surface to the work.

Chart III

GUIDE TO SPINNING OPERATING SPEEDS

Blank Diameter	Approx. R.P.M.	Approximate Peripheral Speeds
3" - 9"	2,000-2,800	2,000- 6,000 s.f.m.
9" - 18"	1,500-1,800	4,000- 8,000 s.f.m.
18" - 30"	1,200-1,500	5,500-10,000 s.f.m.
30" - 50"	800-1,000	7,000-12,000 s.f.m.
50" & Up	400- 500	6,000-10,000 s.f.m.

Work in process in spinning lathe. Note double-lever bar tool with roller, adjustable tool rest, and follower block.



(Left) Combined blanking and trimming operation on stainless steel part. (Center) Perforating a steamer basket blanked from a sheet of 18-8 stainless steel. (Right) Setup in production shop for shearing cut lengths from stainless steel coil.

Hardenable alloy steels are recommended for tool tips and rollers. Preferred roller hardness is approximately Rockwell C-45 to C-50. Rollers also must be ground to required contour and utmost smoothness. If spinning is not to be followed by polishing or passivating, use hardened chromium stainless steel for bar tips and rollers.

Spinning tools that have been used on other metals should not be used on stainless steels before regrinding.

Lubricants must be capable of performing their function at temperatures of 180 to 200° F. or higher. Also, they must be of the proper consistency. Yellow laundry soap or preferably a soap suspension in oil—about one part soap to two parts oil—does an excellent job. The lithopone-linseed oil mixture used in deep drawing works well but requires thorough cleaning. Another preparation, well recommended, is a sodium-base suspended in oil.

When stretching and cold-working are combined in spinning operations greater metal flow or deformation can be obtained than by stretching alone. This means that spinning sequences should produce a continuous stretching action, generally accomplished by working from blank center to edge. Compressive spinning is most difficult and usually should not be attempted. Here are two accepted procedures:

1. Using spinning and follower blocks. Hold blank against spinning block or pattern and center by eye. Move follower block up to where it clamps blank loosely against spinning block. Start lathe and center blank by holding wood block against it. When centered, clamp follower block tightly against blank and spinning block.

A smooth edge helps prevent edge cracking. Shearing burrs and tool marks are removed by holding a file or cutting tool against the edge of the rotating blank before spinning.

To spin, bring tool against blank and work the metal against the spinning block, starting at center of blank (bottom or end of spinning block) and working out toward the edge. Pressure and speed of working depend entirely on "feel" and experience; there are no rules here. Pressures vary from about 500 to 1,200 pounds for hand-operated double-lever tools, from 500 to 2,000 pounds for hand-operated machine rests, and from 500 to 7,000 or 8,000 pounds for power-driven machine rests.

Heavier pressures are used only for thicker gages and more complicated work. On light blanks—about 9″ or more in diameter—consider first turning a flange of about ½″ on the outer edge of the blank in a direction opposite to the dish of the finished job. This eliminates vibration and fluttering of the outer edge of the blank during spinning.

2. Using ring clamp on blank periphery. For large diameter and heavy work, discs may be held at their periphery rather than at center. This calls for a special type of face plate with ring clamp and usually a power-driven tool rest. Clamp the blank tightly and evenly in the ring and set tool rest drive for desired traverse and horizontal feed. Here again rates of tool feed are a matter of "feel" and experience. Set traverse drive to move tool in either direction—edge to center or center to edge—but always keep tool on one side of center; never feed across entire diameter. Pressure depends on rates of traverse and feed and can go as high as 7,000 to 8,000 pounds. Final contour is determined by spinning block set back of the work, or by proper gearing of traverse and feed.

Annealing

Deep spinning operations often require intermediate annealing to relieve stresses and restore ductility. This should be done as recommended in the section on "Annealing and Pickling."

Cleaning

After spinning, remove lubricants completely, especially before an annealing operation. Any standard alkaline cleaner usually is satisfactory—2 to 3 ounces of cleaner per gallon of water at 140 to 160° F. Follow with HNO_3, then rinse in clean, cold water and dry thoroughly.

Zinc alloy dies

Soft metal punches and dies of cast-zinc alloys are used mostly in drop hammer work, but sometimes are employed on single- and double-acting mechanical and hydraulic presses and press brakes. They can be used with and without pressure rings.

These dies cost much less than steel dies and are well suited for short production runs where cost of steel dies might be excessive.

They can be produced much more quickly than steel dies and do not require skilled diemakers. Close casting accuracy often eliminates machining. Softness of the zinc alloy reduces scratching the work, and the alloy is almost completely salvageable by remelting.

Soft metal dies for use on stainless steel are usually cast in sand molds made from plaster patterns. Various zinc alloys are satisfactory, one of which consists essentially of pure zinc with additions of aluminum, copper, and magnesium.

Sometimes a single plaster pattern is made for either punch or die and the mating member produced from the finished casting. When the die is chosen as the "master," an antimonial lead punch should not be used. It is too soft and ductile for stainless steel.

These soft metals are readily cast by conventional foundry practices. Melting points range from about 600 to 1250° F.

Particles of zinc may adhere to the drawn or formed stainless part and

must be removed before annealing or welding to prevent possible "zinc penetration." This can be done by nitric acid pickling.

When using the drop hammer, depth of draws and hold-down devices should be carefully regulated so that the stainless steel will not wrinkle. Wrinkling is difficult to iron out by hammer blows and may be impressed into the surface of the punch.

Cutting

High grade tool steel dies are used for blanking, trimming, or punching stainless steel. Keep dies sharp and rigidly backed up, using more power and slower speeds than for mild steel work.

Chromium stainless steels are blanked and punched much the same as mild steel. Chromium-nickel grades require closer punch and die clearance.

For 20 gage and thinner metal, punch clearance is equal to 1/20 of material thickness. For 19 gage and heavier a maximum punch clearance of approximately .002 to .003 may be used. Sharpness of tools is important with accurate punch and die adjustment.

Perforating also calls for sharp tools, slower press speeds, and greater power.

Holes larger in diameter than sheet thickness are recommended for chromium grades, but for chromium-nickel grades holes should not be less than twice sheet thickness.

Use a good thin stainless drawing compound or cutting oil, especially when work is done with wire size punches.

Shearing

Capacity of a given shear for use on annealed stainless steel will be 50 to 75 per cent of thickness it can handle in mild steel. As a general rule capacity in mild steel is 4 to 5 gages heavier than for stainless steel. Applied, this means that a 14-gage mild steel capacity shear will cut 19-gage stainless steel. A 16-gage mild steel capacity will cut 20-gage stainless steel.

About twice the power is needed to shear annealed stainless steel. For high tensile grades power is increased roughly in proportion to tensile strength.

Use sharp blades of high quality steel, such as solid high carbon, high chrome blades. These are widely used but high-speed steel blades are first choice. They can be obtained in carbon steel with high-speed steel edge inserts.

Blade adjustment for chromium stainless steels generally is the same as for use on mild steel. Chromium-nickel types require closer adjustment with shear blades kept constantly sharp.

Blade clearance for light gages of chromium-nickel stainless is 0.001″ to 0.0015″; for heavier gages 0.0015″ to 0.002″. Sometimes on thin gages it is necessary to operate with no clearance, or at best an adjustment close enough to cut tissue paper.

These same precautions also apply to power-driven tools such as nibblers and high-speed shears.

Blades of hand snips should be kept sharp and closely adjusted. Cutting stainless steels requires plenty of power; so on heavier gages use double cutting or compound lever shears.

Protect the surface

Before shearing protect the surfaces of stainless sheets, especially the higher polishes such as Nos. 4, 6, and 7. These suggestions will help:

1. Apply protective paper.
2. Keep shear table covered with clean, heavy corrugated paper or soft cloth.
3. Use fiber or nonmetallic hold-down tips on the shear.

Sawing with hacksaws

For hand sawing, use a high-speed hacksaw blade with tooth count per inch suitable for thickness to be cut. Coarse blades offer better clearance and help prevent chip packing when cutting bar and wire. In cutting light gage sheets, molding and tubing, blades with at least 32 teeth to the inch are recommended. This assures having more than one tooth in contact with the work. The hacksaw frame should be rigid and well constructed. Do not use power hacksaws to saw light gage sections. Better tools are available.

Generally, 40 strokes per minute is adequate for hand sawing of stainless steel. Excessive speeds will cause a saw to overheat, lose temper, and wear rapidly.

Apply constant pressure on the forward cutting stroke to prevent slipping of the saw. All teeth should be engaged throughout its cutting length. Relieve pressure on the back stroke to prevent dragging. This is especially important with chromium-nickel grades because slipping on the forward stroke or dragging on the return stroke will work-harden the metal.

Cutting compounds are generally not used in hand sawing stainless steel.

Power band saws

These are handy, cost-cutting tools for cutting contours. They also are useful for many blanking and trimming jobs that otherwise would necessitate expensive cutting dies. Band saws are used for both low-speed and high-speed or friction sawing. Cutting rates are exceedingly fast for the latter.

Low-speed sawing

Here metal is removed in chip form by the cutting action of individual saw teeth. A fine band saw with 24 to 32 teeth to the inch is recommended for lighter gages of stainless steel. Coarser saws are used for heavier sections.

Teeth must be very sharp. For use on chromium-nickel stainless the work must be fed against the saw with enough force to keep the saw cutting continuously. Otherwise useful life of the saw will be short. A coolant is necessary for cutting thicker sections but not for lighter gages. (See recommendations in "Low Speed Sawing of Stainless Steel.")

High speed or friction sawing

In high speed sawing, friction between the fast-moving cutting edge of

(Left) Cutting 20-gauge stainless steel on felt-covered table with power-driven portable shear. (Center) Contour cutting a stack of stainless sheets with low-speed band saw. (Right) Trimming flange on stainless part with friction saw.

Chart IV

LOW-SPEED SAWING OF STAINLESS STEEL

Saw Type	Precision or Claw Tooth
Saw Pitch	Under 1/16" thickness — 24-32 teeth per inch 1/16" thickness — 24 teeth per inch 1/4" thickness — 14 teeth per inch 1" thickness — 10-8 teeth per inch 3" and over — 8-3 teeth per inch
Saw Set	.042"-.065", depending on width of saw used
Saw Width	3/16" to 1", depending on whether straight or radius cut
Saw Velocity	Under 1/16" thickness — 100-150 feet/minute 1/16" thickness — 100 feet/minute 1/4" thickness — 75 feet/minute Over 1/4" thickness — 50-75 feet/minute
Cutting Rate	Under 1/16" thickness — 2.50-4.00 sq. in./min. 1/16" thickness — 1.00-2.50 sq.in./minute 1/4" thickness — .75-1.00 sq.in./minute 1" thickness — .50-.75 sq.in./minute 3" thickness — .107-.50 sq.in./minute
Coolant	Cutting Oil — 20 drops per minute at point of cut

the band saw and the stainless steel raises the kerf material to a high temperature. When the material in the path of the saw blade reaches the plastic point, it is oxidized and removed by the saw teeth.

This stage is said to begin at the minimum saw speed of 1000 lineal feet per minute for very light gages, increasing up to about 15,000 lineal feet per minute for a 3/4" thick section. This means that wheels must be strong and well balanced to endure the high service speeds.

Friction sawing has been done at rates up to 140 lineal feet per minute in light gage stock. It has been notably successful in thicknesses up to 3/8". Due to the "set" of the saw, radii is easily cut down to 1/8". Use as wide a saw as possible for radius cutting with little feed pressure. On lighter gages it is only a matter of ounces.

There is said to be no detrimental thermal penetration as in torch cutting. (See "Friction Sawing of Stainless Steel" for highspeed band saws to be used at speeds up to 15,000 s.f.m.)

Abrasive cut-off wheels

Cutting off stainless steel bar stock, tubing, and molding can be done efficiently and speedily with abrasive cut-off wheels. A coolant may or may not be used. Cutting speeds are extremely fast—4 seconds per square inch for dry cutting; 7 to 8 seconds per square inch for wet cutting.

In dry cutting, the wheel both grinds and burns out the metal, which presents the hazard of heat-tinting, burning, and burring. Resinoid-bonded wheels are more heat-resistant than rubber-bonded wheels, and therefore are more generally used. Speeds run as high as practical limitations permit—about 10,000 s.f.m. for 12" wheels and 16,000 s.f.m. for 10" wheels.

Wet cutting calls for rubber-bonded wheels with finer grits. Wheel speeds are about two-thirds those used for dry cutting. Slower, cooled cutting lengthens wheel life and produces a smoother cut virtually free from burrs. Large quantities of coolant are required. Jets are directed to both sides of the wheel at its point of contact with the work. Sometimes the operation is performed submerged. Water will serve as the coolant, but add one per cent of soluble oil to protect equipment from rusting.

Experiment to determine correct wheel speed for the particular job. Fast feeding will overload the motor and cause excessive wheel wear. However, if feed is too light the wheel tends to rub instead of cut. This causes overheating, rapid wheel wear, and work-hardening of the piece.

Stock loss in cutting by this method is only slightly more than the wheel width—1/32" to 1/8".

Manufacturers of abrasive cut-off wheels will gladly supply additional information about recommended grits and bonds for any specified work to be done on stainless steel.

Torch cutting

Torch-cutting methods that work with carbon steels have not been successful with stainless steels. A flux-injection oxyacetylene method has solved the problem economically.

Following a normal preheat, this equipment cuts stainless steel at about the same speed as carbon steel. It has a modified torch that delivers a flux to the torch tip. This flux combines chemically with the protective oxides to produce a low melting-point, free-flowing slag.

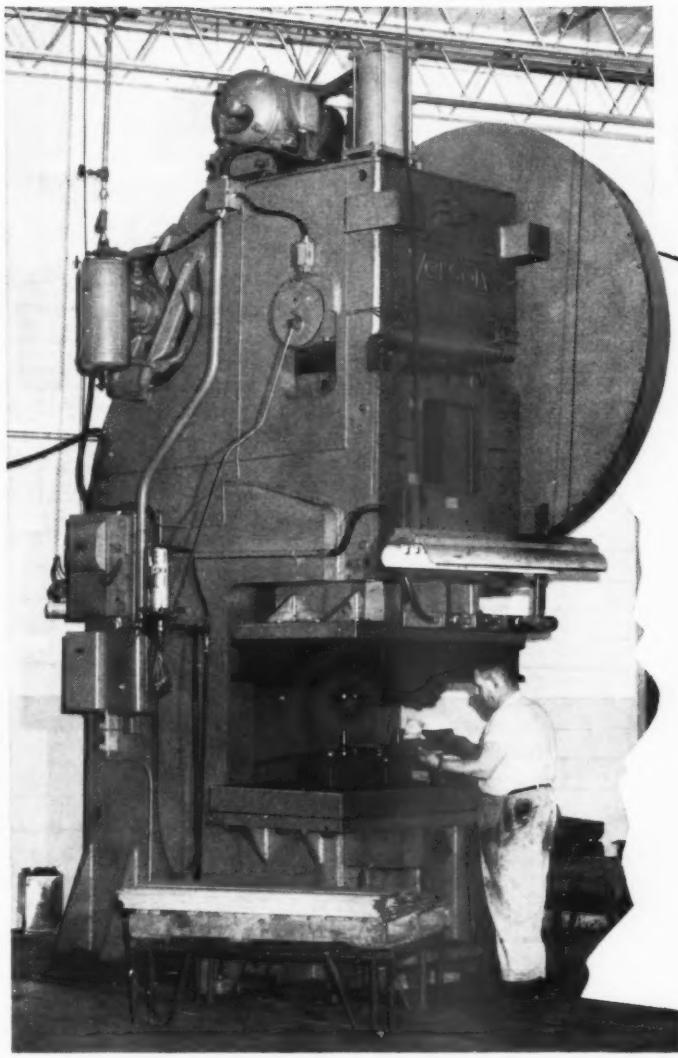
The equipment is designed for both machine and hand cutting. The flux-injection unit weighs only about 75 pounds when fully charged with 35 pounds of flux—enough for 5 hours of continuous operation.

The flux is safe and non-combustible, and may be stored over long periods. Desired rate of flux delivery is controlled by a simple regulating valve. (Editor's note: Additional information concerning stainless torch-cutting can be obtained by writing to the author in care of METAL PRODUCTS MANUFACTURING.)

Chart V

FRICTION SAWING OF STAINLESS STEEL

Saw Type	Friction
Saw Pitch	Under 1/4" thickness — 14 teeth/inch 1/4" - 1" thickness — 10 teeth/inch
Saw Set	.055" - .058", depending on width of saw used
Saw Width	1/4" to 1", depending on whether straight or radius cut
Saw Velocity	Under 3/8" thickness — 6000-9000 feet/minute 3/8" - 5/8" thickness — 9000-12000 feet/minute 5/8" - 1" thickness — 12000-15000 feet/minute
Feeding Pressure	Light to heavy depending on work thickness
Cutting Rates	1/16" thickness — 1440 lineal in./min. 1/8" thickness — 900 lineal in./min. 1/4" thickness — 55 lineal in./min. 1/2" thickness — 20 lineal in./min. 3/4" thickness — 10 lineal in./min. 1" thickness — 6 lineal in./min.
Type of Finish	Good-slight burr at bottom of cut, projecting 1/32" - 1/16". No heat penetration on thin material to approximately .003 on thick material.



A Verson Press user reports on versatility:

"...it would be an almost impossible task to list all of the usages to which our

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W. D. Tucker

General Manager
John Blue Company, Inc.

We at Verson often talk of the versatility of our presses and the advantages they offer anyone engaged in the press forming of metals. This is more than just talk . . . it is an established fact, attested to by a host of satisfied customers.

The above excerpt is from a letter recently received from Mr. W. D. Tucker, General Manager of John Blue Company, Inc., Huntsville, Alabama, a leading manufacturer of farm equipment. Mr. Tucker goes on to say that since the Verson Gap Press is the largest in the plant, it is put into service on practically every application including drawing and forming steel shapes, multiple forming, punching and shearing operations.

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Impossible yesterday . . . in production tomorrow

an editorial on the subject of industrial organic finishing

by E. A. Zahn • INDUSTRIAL FINISHES CONSULTANT

INDUSTRIAL paint application is again the subject. What was definitely impossible yesterday is in successful production today. It only seemed impossible yesterday because the courage to make it work had not yet been fully developed. There are many who would agree that our industrial problems can reasonably be divided into 99.5 per cent people problems and 0.5 per cent mechanical problems. The people problem will perhaps never change, but the material problems must be tackled and solved. It isn't easy in view of the many opinions which are so freely offered by those whose only crime is insufficient knowledge of industrial finishing hazards.

If a good slogan were ever to be adopted, it probably would be "There Must Be A Better Way" and this can of course apply to many specialties other than industrial painting. The fact that there is a better way has been proven each time that something new was adopted. The individual who alone felt that there must be a better way, often had the whole load to carry in proving his point but he did not necessarily get all of the credit when it worked. In fact, those who are looking towards a better way don't really need individual credits. Their pleasure and pay comes mainly from finding the better way.

It takes courage to make changes

In industrial painting today, many new challenges are being met and quite obviously many of these are based on emergency needs. Also, it is quite obvious that the first users of the new and improved methods have also placed themselves in an enviable competitive position. It really takes a lot of courage to make a major change in paint application methods. Along with the courage, a great deal of common sense must also be employed. Courage and common sense is a combination, however rare, that just cannot be beat. They are essential to each other.

In terms of major changes, it is always easier to copy and improve than to make an original change. What one has done, along the lines of a new development, another can improve on quite easily, provided of course that the same combination of courage and common sense are applied. Nearly everything that makes up our routine of applications today, was impossible at one time in the past, or rather, it seemed impossible until someone had the courage to try to do it.

Perhaps one of our most important problems in industrial finishing today, is the lack of a cataloging system of existing successes. There are a great many important successful industrial paint application developments for nearly all types of products which are presently unknown to many important users. These application developments are by no means confined to normal automatic paint application methods. Even the lowly paint brush has found a place in automatic application machinery and it is doing a good job too. Why not? All that is asked of the paint brush is to smooth out the paint material and wipe off the surplus. It appears that this is what the paint brush was made for in the first place. It is rather amazing too to find that the life of a paint brush held in a stationary fixture is about ten times as long as it is in the hands of a painter.

Direction ➤ 100% utilization, 100% solids

The trend in new application development is of course still in the direction of one hundred per cent utilization, and at one hundred per cent solids. The full utilization part has already been accomplished many times over. The application mixture solids are going higher and higher, and in some new applications have passed the eighty-five per cent solids mark. The full utilization application methods are also credited with improved films with higher density and improved appearance. It would be a good idea to pause here, too, to remember that this one hundred per cent utilization accomplishment is in standing competition with methods producing less than fifty per cent utilization. Assume that there are two users, competitive, using the old and the new methods where the lower utilization method requires twenty drums of paint a week at $3.50 a gallon. The high utilization method competitor has an automatic advantage of nearly $2,000.00 a week without counting his lower labor costs and other associated gains which are normal with the new automatic painting methods.

The job shop is increasing in importance and popularity. Many manufacturers are farming their smaller variety finishes to the job shop and wisely so too. In these job shops, the entire activity and thought is finishing and a finishing flexibility is maintained which would be impossible for the individual manufacturer. But, the job shop variety handling and hand application methods do not belong in the mass production plants.

THE AUTHOR

E. A. Zahn is well known as a counselor and consultant on industrial finishes problems. He has spent twenty-nine years in laboratory development and production application of finishes. He is also known for his work on simple, reliable test methods. He developed the Zahn Viscosity Cup which has found wide use for the rapid determination of viscosity of coating materials. He received the Charles A. Coffin Award of the General Electric Company in 1938 for his contributions to the electrical industry. Mr. Zahn is the author of two books on the subject of flow coating and paint evaluation, and a third new book, "Industrial Finishing and Common Sense."

The opinions as expressed in this editorial feature are those of the author, based on his experience, and do not represent an evaluation by MPM editors.

There should be a system of cataloging successful new painting method installations for the benefit of industry. It is quite apparent that some manufacturers are still trying to collect enough courage to make a change, while some others, unknown to them, are already basking in the limelight of success. If there were some way to list all of the successes, it could possibly result in something like a revelation in industrial painting.

For the three-drum-a-week user

The cost of today's new automatic painting equipment is at present, the lowest in history. Yet, there are many potential users of it who believe that these costs are prohibitive and for that reason do not bother to investigate them. The three-drum-a-week user has a great deal to gain through the adoption of some form of appropriate automatic equipment. Many users who have made the change have enjoyed amazingly quick amortization. Reports indicate and also confirm that amortization periods range mostly from five weeks to one year depending on the size of the investment. This is quite interesting in view of the estimated profitable amortization periods of from five to ten years which were acceptable only a few years ago. The return of the modernization dollar is nearly always guaranteed. It is always a great deal higher than the original estimates indicated.

It would be well for the manufacturers to keep in mind that their present mild, docile competitor can suddenly become a violent and dangerous competitor if he is the first to take advantage of the new method change. There won't be any warning and it would leave the trailing competitor in a trailing position for a long, long time to come.

Everything in volume manufacture can be finished automatically with high utilization and a better finish. For the most part, it is already being done somewhere. The user to-day cannot afford to continue with the low utilization and hand methods in view of the stampede nature of the conversion that is obviously in the offing. In most manufacturing, management men still have the choice of whether they want to be first or whether they want to copy.

Controlling the reject rate

The high reject rates common with hand application have robbed the user almost as much as the fifty per cent utilization has robbed him. It is no longer just a case of improving utilization through automation. It is a case of cutting paint usage in half. It isn't a case of merely *reducing* the labor cost either. With the step to automation, through labor elimination, product uniformity is assured. With product uniformity control, the reject rate is also controlled.

The value of uniformity in production automatic finishing is quite difficult to estimate, but it is very easy to see never-the-less. Uniformity in product quality and appearance also means that it is possible to tighten the controls for constant improvement. Uniformity literally opens the doors for paint material improvement also. This possibility has long suffered with the application confusion which exists in hand application locations. Finally, the uniform product appearance has an additional value in that it becomes the quality trade-mark of that manufacturer.

The user with the finishing problem is quite often misled through the advice of well meaning but not sufficiently informed advisors. Perhaps this is a common problem with most of us. We prefer to try to supply answers even if we don't know them rather than to say we don't know. Many users inquire about methods such as flow coating for example, because they are of the opinion that their product would lend itself to simple conveyor hanging. The answers that they receive may be negative but, at the same time, much more difficult parts are being flow coated very successfully. As a matter of fact, some users of the flow coat process are coating forty to sixty foot long parts horizontally, and very neatly too.

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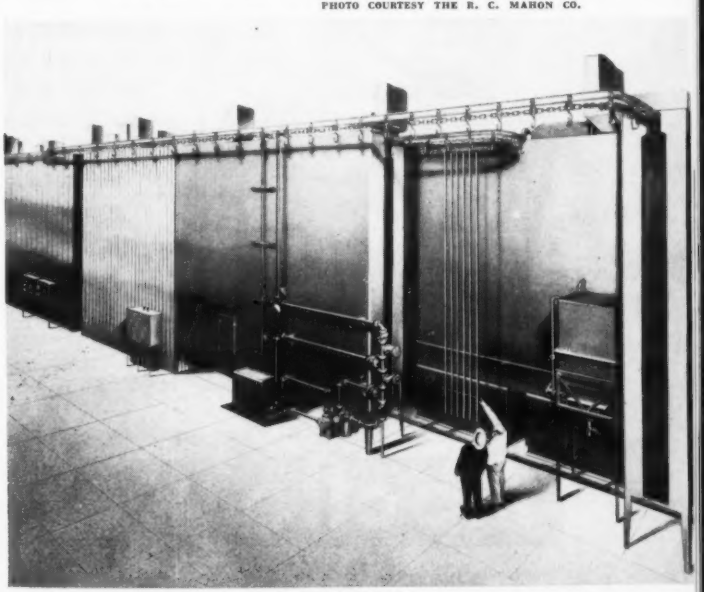
Electrostatic spraying equipment is gaining in popularity each year. This photograph shows gasoline pump housings being painted with floor-mounted equipment and a loop conveyor. Bowser, Inc. has almost doubled its production of pump parts per gallon of paint.

PHOTO COURTESY RANSBURG ELECTRO-COATING CORP.

Flowcoating has made great strides during recent years. This mamoth flowcoating machine is used for coating 20-foot long box-channel sections. They are cleaned, rust-proofed, and painted inside and out. 200 channels per hour are finished at Ainsworth Mfg. Corp.

PHOTO COURTESY THE R. C. MAHON CO.



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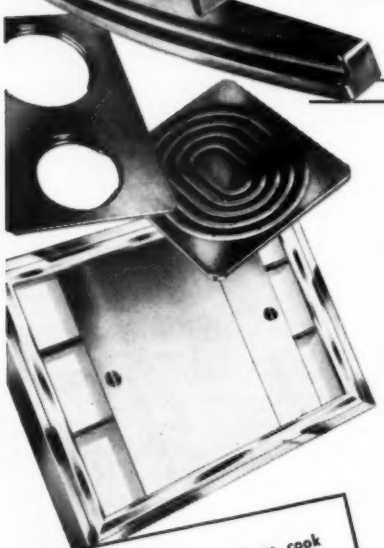

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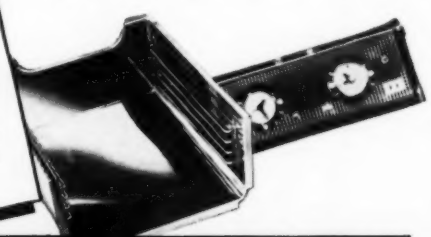

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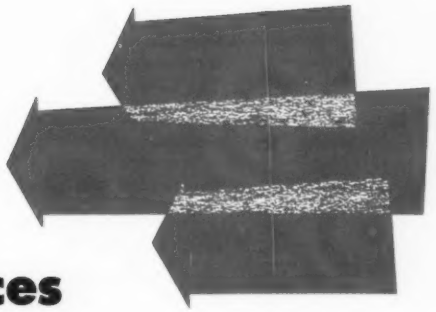
The testing and application of solenoids for appliances



by J. Gebel and D. O. Myers • SORENG DIVISION, CONTROLS COMPANY OF AMERICA

THE solenoid has become an increasingly-important component in many appliances for the effective and economical transmission of motion. Typical functions include the performance of the mechanical work for operating valves, clutches, brakes, pumps, or any similar devices requiring controlled motion.

In general, applications for solenoids can be divided into two main groups according to applications — commercial and industrial. The commercial solenoid as used for appliance applications would normally have an intended life below 100,000 cycles, for in most cases this would far exceed the expected life of the applications. To impose a higher requirement for these applications would result in economic loss.

On the other hand, industrial solenoids are designed and built for extremely long life (several million cycles) and, for the most part, they are used on machinery and controls for operation at regular intervals.

Minimum operating voltages are important and are normally specified from the experience of users. Voltage fluctuations vary more in the home than for industrial applications and are therefore important to the appliance manufacturer. In the appliance field, values vary from 90 v. to 100 v. for 120 v. ratings. It is therefore important that pull curves be supplied at different voltages. In the appliance field, the operating intervals are irregular and the solenoid must be checked for temperature rise on the application, in order that Underwriters' Laboratory requirements are satisfied.

Current or volt-ampere curves versus stroke are desirable and of considerable interest for application and test engineers. The current curve at 120 v. would suffice and eliminate any doubt as to choice of a particular value. Power or wattage curves are not too important since the power consumption is relatively small when the plunger is seated.

The pull of an A.C. solenoid is a series of jerks pulsating at twice the line frequency until solenoid seats and shading coils take effect. The instantaneous force at a fixed plunger displacement can be expressed as $F = \frac{(Bm \sin \omega t)^2}{72}$. Once the plunger is allowed to move, the expression for force becomes quite complex and the problem resolves into one of accurate measurement. Expanding the above formula, it can also be shown that instantaneous force is proportional to the current squared. The important variables then resolve into voltage and temperature effect on resistance.

Importance of temperature

The importance of temperature and its effects cannot be overstressed. There is the question of optimum temperature for conducting pull measurements. From an application standpoint, the pull curves should be at the temperature at which the solenoid is expected to operate. Since the temperature on various appliances could vary over a wide range, a compromise is necessary.

Another consideration is that the temperature be sufficiently high so that the rate of change during testing can be kept to a minimum. Experience indiactes that a temperature of 65° C. (149° F.) should satisfy both the conditions of measurement and application. This approximates the operating temperature of solenoids in most appliances.

To show pull curves at the optimum temperature of the insulation (105° C.

Desirable data for solenoid selection

Commercial Solenoids	Industrial Solenoids
Force curves — pull Vs. stroke at 120V, 110 V, 100 V, and 90 V all at a specific temperature.	Force curves — pull Vs. stroke at 100%V and 85% V at a specific temperature.
Current curves — steady state current Vs. stroke at 120 V.	Current curves — steady state current Vs. stroke.
Duty — to meet Underwriters' Laboratories limit.	Duty — strokes per minute for per cent "on" time and per cent of stroke at 100%v.

Note: The procedure and technique for establishing common characteristics should be the same for either commercial or industrial solenoids.

for Class A) would necessarily penalize the application where the unit is used at a lower temperature. The suggested temperature (65° C.) is a compromise in that it would otherwise entail countless hours to test solenoids at various voltages and temperatures.

Relation of seal-pull to noise level

The term "seal-pull" is used to designate the pull at zero stroke or when the plunger is seated on the frame.

In Figures 1 and 2, the pull curves are discontinued at about 1/32 to 1/8 of the stroke. The pull, however, increases rapidly beyond these points; but, for all practical purposes, will not be useful.

To carry the pull curves beyond the point where additional load causes the solenoid to "chatter" would be misleading. It is, therefore, necessary to indicate the maximum allowable pull which will give quiet operation. This quiet seal-pull can vary to some degree in one size solenoid. The surface area, finish, and residual springs are some of the factors contributing to this quiet seal-pull.

The basis for establishing this quiet seal-pull is to apply an increasing load to the point where an audible chatter becomes evident. Due to variations in this quiet seal-pull on different solenoids, a reasonable quantity should be checked. The value specified will depend upon the ease to maintain a minimum quiet seal-pull.

Outline of test conditions

To obtain comparable pull-curve results, it is necessary to specify permissible tolerances of the variables involved. These tolerances should be within the practical limits of the technique and equipment.

1. The pull varies approximately 2% per volt. A limit of 1 volt is not too difficult to control. A 2.5 KVA adjustable power supply will provide fairly stable regulation. Allowance for the voltage drop at each measurement is to be made.
2. The pull is to be made after the transient current subsides. This will be done by holding the load momentarily at the time the solenoid is energized.
3. All measurements are to be made at 65° C. (149° F.) for all positions of the stroke.
4. Pull measurements are to be made on the solenoid in a vertical position with the plunger weight against gravity. The plunger weight is to be added to the pull value. This plunger weight is to be shown for use as may be required, depending upon the position of the solenoid in the application.
5. The pull curve will not be extended beyond the limit of quiet seal-pull.
6. The pull of the solenoid will be considered the load that is lifted about 1/16" from the set stroke. In most instances the plunger moving 1/16" will pull in completely. However, where pull decreases during the stroke, the plunger may stop at some interim point. The 1/16" movement has been selected as giving average pull when compared to other methods of determining the pull characteristics.
7. Pull measurements will be made at

SOLENOID PULL AND CURRENT CURVES

FIGS. 1 & 2. These solenoid pull and current curves show the characteristics of four sizes of constant (Fig. 1) and intermittent (Fig. 2) duty solenoids. A wide range of application requirements can be covered with these solenoids. The selection of the proper size unit will depend on the matching of load to pull curve for maximum performance.

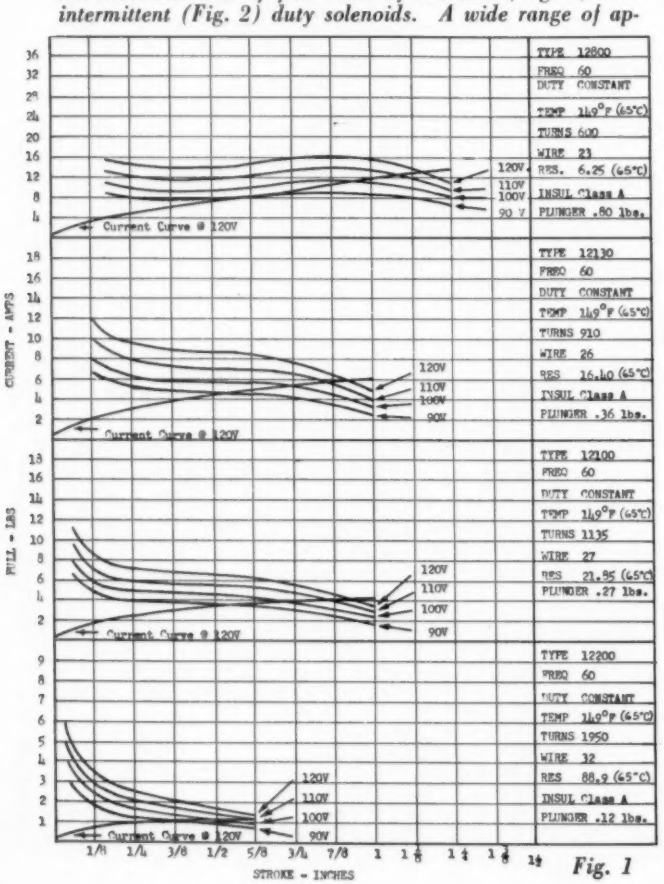


Fig. 1

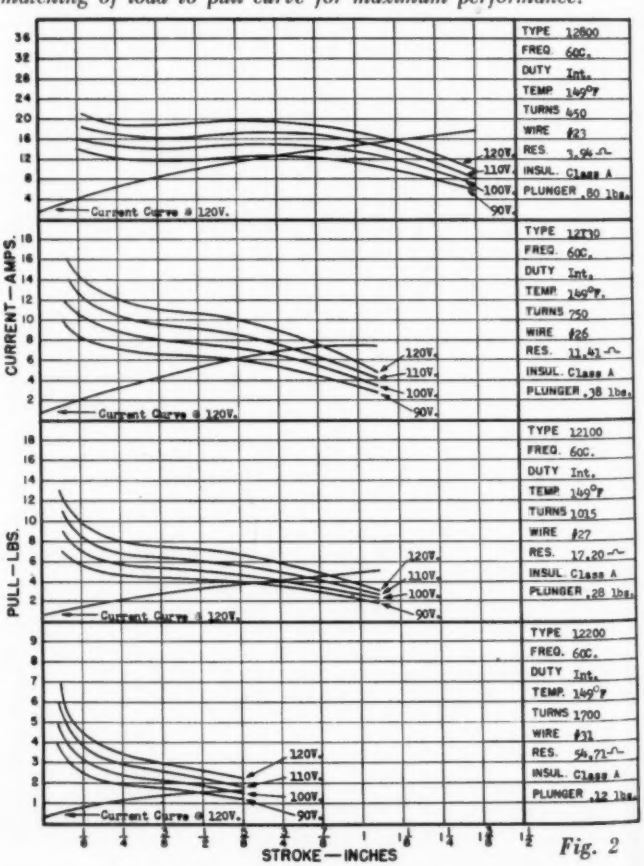


Fig. 2

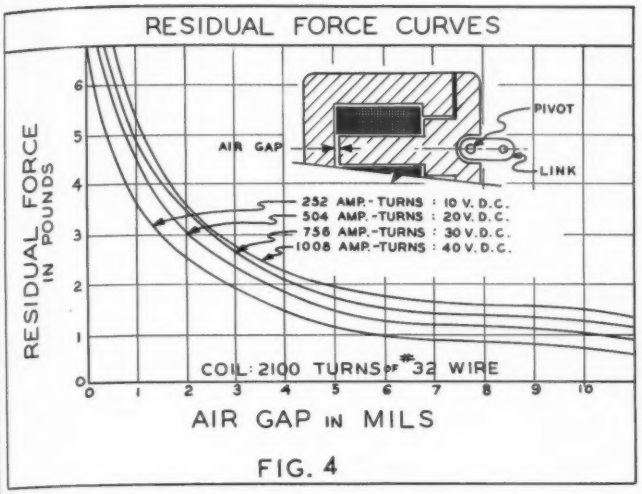


FIG. 4 (above). All solenoids exhibit a certain amount of residual magnetism when the coil is de-energized. The force of this residual magnetism varies with the air gap between the plunger and the frame. Normally, this residual force is not a factor when the load is matched close to the pull curve. Ample return force exists to return the plunger to the open position.

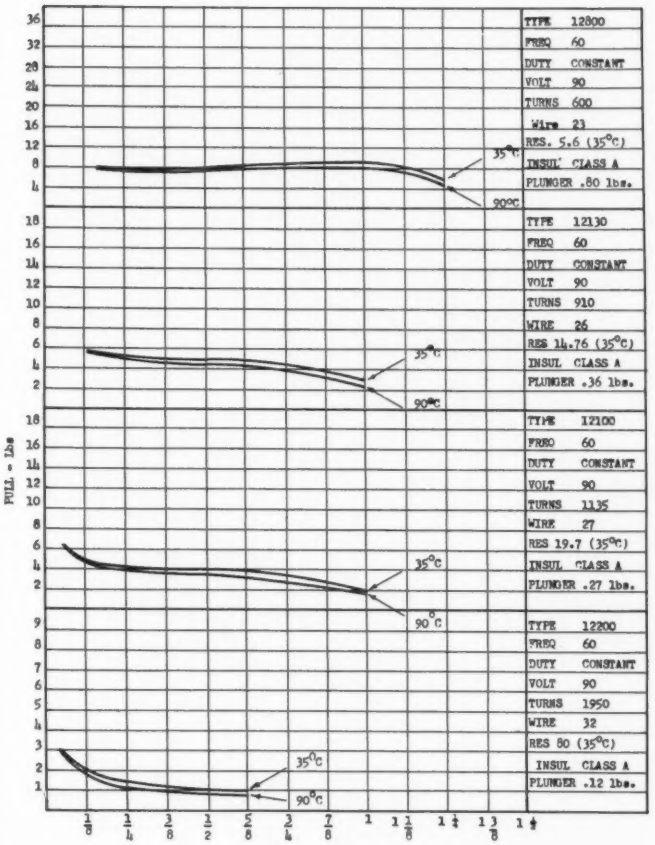


FIG. 3 (right). The pull curves in Figs. 1 & 2 were made at a temperature of 65°C (149°F). This temperature was selected as a compromise between application conditions and ease of testing. In some applications, it is necessary to take into account the change in pull due to temperature variation. This graph shows the amount of change for a temperature variation of 55°C for constant duty solenoids.

intervals of ⅛" stroke using "dead" weights.

With these conditions as a basis, we can now proceed to develop the test procedure.

Test procedure sequence

1. Mount solenoid securely in place, so that the load will be perpendicular to the seating surface and the plunger free to pull in when energized.
2. Measure the resistance of the solenoid coil at room temperature. Deduct the resistance of the lead wires. Calculate the coil resistance at 65° C. with the formula $R_2 = \frac{229\ R_1}{234 + T_1}$. Add the lead resistance to the value R_2 for Wheatstone bridge setting.
3. Adjust the plunger for the desired stroke.
4. Set the test voltage with the plunger held in place at the stroke position.

Pull determination

1. With the plunger at the desired stroke, apply weight until the plunger just begins to move when energized. Each time the solenoid is energized. the plunger is restrained momentarily to eliminate the effects of the transient current.
2. Recheck the voltage setting and adjust the temperature of the solenoid to 65° C. by either heating or cooling as may be required. To increase the temperature, hold the plunger and energize the solenoid.
3. Make final adjustment of the maximum load which the solenoid will lift at least 1/16" without bounce.
4. Repeat the above for ⅛" increments of stroke. The voltage must be adjusted at each displacement and the temperature maintained at 65° C. for the final measurement.
5. Use the same procedure to obtain curves at the other voltages.

Current curves

To make the current curves, the same control of the variables, voltage, and temperature are necessary. The plunger is blocked for about every ¼" increment of stroke and the current read quickly after the initial surge.

As will be evident, both economy and operating simplicity were given consideration in connection with the development of the technique for making measurements of pull and current. The procedure outlined will give readings within 5 per cent under the conditions specified. The results from this procedure coincide very closely with the values obtained by means of a dynagraph.

A most important consideration in connection with the use of pull curves is agreement on specified conditions under which the curves are to be made. Uniform test conditions are of prime importance.

Proper utilization

The proper utilization of a solenoid, as with any electromagnetic device, depends upon a careful understanding of requirements and the operating conditions involved. When operating problems arise they can, in many instances, be traced to abnormal operating conditions. It is therefore important for the appliance engineer to have an understanding of the basic solenoid principles, as well as their limitations.

For example, to obtain the maximum performance in a solenoid, the load should be matched to the specific pull curve. Selecting a larger solenoid, with

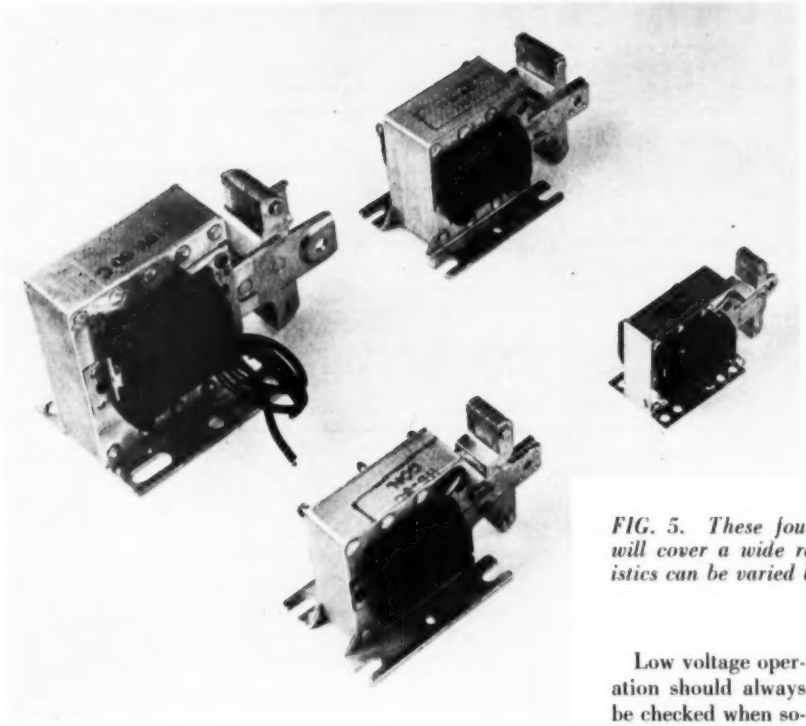


FIG. 5. These four double "T" solenoids in standard sizes will cover a wide range of applications. The pull characteristics can be varied by changing the winding to match the duty requirements.

considerably more pull than required, causes excessive impact. The excess energy is absorbed in the frame and plunger and as a result the rate of wear is increased.

As another example, the plunger stroke should be as short as possible to reduce the impact and wear. This is especially desirable where the load is constant. With a constant load it would be favorable to add a spring load to decrease the excess energy.

Low voltage operation should always be checked when solenoid is at its maximum operating temperature. If care is not observed, a solenoid may not pull the load in when hot, and will heat excessively and burn out.

Mounting and environment

Many of the problems encountered with solenoids are related to incorrect mounting. For maximum performance the unit should be mounted with the plunger either vertical or horizontal. At no time should it be mounted on a side, as excessive wear, a sticking plunger, or burnout may result.

The environment imposed for solenoid installation in some appliances calls for extreme care in design. Grease, lint, dirt, high humidity, and high ambient temperature are among the hazards to be considered. For example, locating the unit in a high ambient temperature zone will reduce the resulting pull since it is necessary to keep the temperature rise within the Underwriters' Laboratory limits. It can also be more costly, in case a larger solenoid is required to meet the pull conditions.

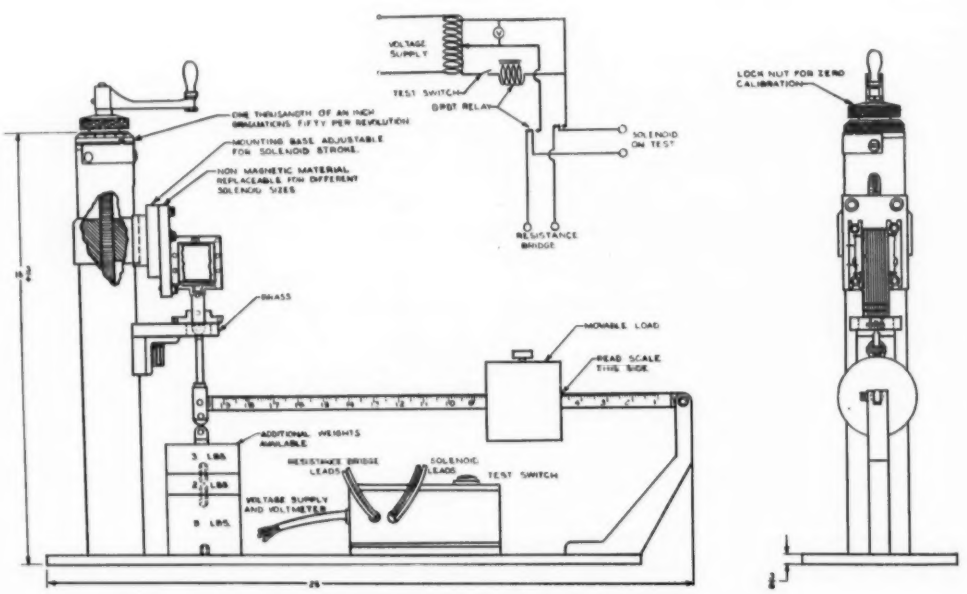
The unit should, if at all possible, be located in a position where it will be free of highly-humid, corrosive conditions, and where it will not accumulate lint or dust on the seating surface. The coil is moisture proofed in production, but if corrosion of the seating surface is allowed to occur, the unit may become noisy. Sufficient foreign material on the seating surface to prevent the plunger seating properly may also cause noise.

How to select solenoids

It is possible through the use of composite pull and temperature curves (see Figures 4 and 5) to at least make a preliminary selection of the proper

to Page 88 →

FIG. 6. To measure the pull characteristics of a solenoid accurately and rapidly, proper test equipment and technique is necessary. The tester shown was designed to obtain the effective load for a given stroke very rapidly at the selected temperature. Measurement of temperature can easily be made with a resistance bridge from the control box. Total pull for average weight — .85 + .31 x scale reading in pounds.



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EXCLUSIVE MPM PHOTOS

L. J. DiAngelo, advertising and merchandising manager of Hotpoint, and Mrs. Jack Sharp, wife of president of Hotpoint, are shown here with one of the custom-made ranges.

OPTIMISM among the manufacturers, and sparkling new appliance features, were the highlights of the Home Furnishings Market held in Chicago from January 6-17. Never before have the appliance manufacturers turned more of their attention to product styling. Several manufacturers exhibited "custom designs" and "products of the future" to survey response before planning production models.

Range features included more easily operated controls, "top of the line" features in 30″ ranges, unique rotisseries, splash proof broiler units, and radio controlled ovens, to name a few.

Forecasts optimistic

The great majority of manufacturers surveyed felt that the business outlook for 1958, as far as they were concerned, is good. As a matter of fact, several key executives polled thought very strongly that 1958 would be just about a record breaking year. However, these same executives did not want to be quoted in this extremely-optimistic viewpoint, and talked in terms of three- to six-per cent gain when speaking for published quotes.

Refrigerator features

The majority of the refrigerator manufacturers have turned to the "square look" in exterior design. An extensive use of aluminum and stainless steel trim, and vinyl plastic color panels, is

Comments by appliance manufacturer executives:

E. CARL SORBY — GEO. D. ROPER CORPORATION:

"The new Roper line for 1958 has design features (the Rotis-O-Grill, for example) that will do a great deal to obsolete the earlier gas ranges. We expect built-ins to increase in sales during 1958 by thirty per cent over 1957. This will not be a deduction from sales of Roper free standing ranges, as we ex-

ote of

me Furnishings Market

now being made. Several manufacturers of refrigerators also offer kits to install refrigerators as built-ins, thereby providing the consumer with a choice of built-in or free standing installation.

With the news that Whirlpool had purchased Servel's refrigerator manufacturing facilities and all patent rights, company officials reported that most of those who visited the Whirlpool space expressed enthusiasm over the fact that the automatic ice maker will be available in a nationally marketed gas and electric refrigerator.

Battery operated T-V

One of the attention-getting new products at the Home Furnishings Market was Motorola's portable battery operated transistor television set. The only tube in the set is the fourteen-inch picture tube. Even some of the competitive television manufacturers were disbelieving when they heard that Motorola had a transistor television, but Motorola engineers and the product were available at the show to convince the skeptics.

Dishwashers on the increase

Several manufacturers felt that dishwashers will account for more sales this year than ever in the past. A greatly improved product by many manufacturers will be a deciding factor in this increase, it is felt.

pect an increase of twenty per cent in our sales of free standing ranges, also. We also anticipate that built-in sales will eventually reach forty per cent of total ranges sold."

L. J. DIANGELO—ADVERTISING-MERCHANDISING MANAGER OF HOTPOINT:

"We are starting to get public reaction from our custom designed ranges, refrigerators and other appliances that are on display here. As soon as we get a real cross section of not only the

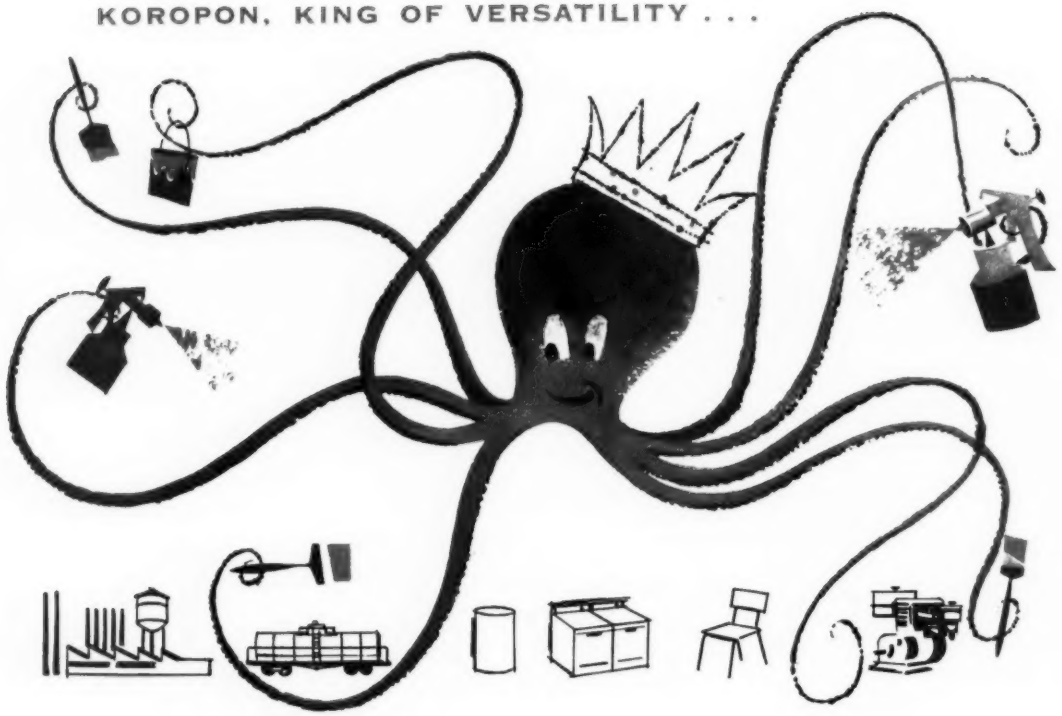
Miss Marcia Mead, director of Home Service, and "Reg" Armstrong, general sales manager, Electric Utilities Div., Whirlpool Corp., are shown here with one of the new thirty-inch ranges.

I. L. Griffin, sales planning manager, range dept., General Electric Appliance Park, Louisville, Ky.

EXCLUSIVE MPM PHOTOS

Fred Maytag II is quite proud of their new filter-agitator in this view. The gold lapels on his jacket signify Maytag's fiftieth anniversary in the industry in 1958.

KOROPON, KING OF VERSATILITY . . .

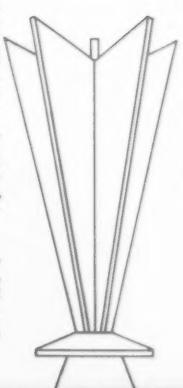


KOROPON—the most versatile enamel line—can be applied in any manner; engineered to cure by any method; supplied in an unlimited range of colors, glosses and clears. KOROPON enamels will withstand nearly any abuse.

KOROPON's versatility permits use on furniture, hardware, evaporative coolers, gasoline engines and interior surfaces of food containers. KOROPON enamels are used for maintenance in chemical plants and pulp mills where ordinary paints are quickly destroyed by corrosion.

UNITED was one of the first carload purchasers of epoxy resin. Our experience with epoxies is probably the longest in this country . . . when you consider epoxies, think of KOROPON and UNITED, so . . .

Let's get acquainted. Ask for one of our paint-problem experts to call on you. After viewing your operation, he can discuss a KOROPON specifically engineered for your requirements.



FIVE STRATEGICALLY LOCATED PLANTS

EAST
Benjamin Franklin Paint and Varnish Co.
Philadelphia, Pa.

SOUTHEAST
Carolina Paint & Varnish Co.
Greensboro, N.C.

CENTRAL
Illinois Paint Works *Chicago, Ill.*

WEST
Pacific Paint & Varnish Co. *Berkeley, Calif.*

SOUTHWEST
De Soto Paint & Varnish Co. *Garland, Texas*

UNITED

WALLPAPER, INC., 1350 SOUTH KOSTNER AVENUE, CHICAGO 23, ILLINOIS • ROCKWELL 2-5000

distributors, dealers and buying public, but the builders and architects, we will place the indicated appliances into production."

ROSS ARBUCKLE — MANAGER OF REFRIGERATION AND FREEZERS AT WESTINGHOUSE, COLUMBUS:

"The new textured panel of vinyl, offered on our 1958 refrigerator line, has been out since last August and has gone far beyond our expectations. We underestimated the requirements and are back-ordered on this trim idea, but we shall be able to supply the demand very shortly."

PHOTO COURTESY HOTPOINT CO.

A complete built-in electronic and electric cooking center in 58 inches of space is one of a series of nine new "Custom Trend" appliances introduced by Hotpoint at the January Home Furnishings Show in Chicago. Control panel in center divides electronic oven (r.) and regular oven.

I. L. GRIFFIN — GENERAL ELECTRIC SALES PLANNING MANAGER, RANGE DEPARTMENT, LOUISVILLE, KENTUCKY:

"We anticipate a slight increase in the sale of electric ranges for 1958 over 1957. The increase should be in the neighborhood of five to six per cent, mostly in the latter part of the year. Built-ins will account for most of the increase."

MICHAEL STEVENS — KEY ACCOUNTS MANAGER, AMERICAN KITCHENS, TRACY DIVISION, VICLAD INDUSTRIES:

"The portable dishwasher has expedited the progress of making the dishwasher a major appliance. I feel that automatic dishwashers, including the portable type, will account for over 500,000 units in sales in 1958."

to Page 59 →

Mary Huck, home service director of Frigidaire, Dayton, shows how easy it is to use their new broiler pan. The pan is made of aluminum.

MPM PHOTO

R. P. BROOK — MANAGER OF RANGE DEPARTMENT, WESTINGHOUSE, MANSFIELD:

"I believe that the free standing range will continue as a high volume model. The 30″ range undoubtedly is coming more and more to the forefront. It is our estimate that the 30″ model will, in 1958, attain at least eighty per cent of the total *free standing* business. We feel that built-ins, probably, will account for forty per cent of the total electric range business in 1958, but I doubt very much if in the next ten to fifteen years that built-ins will ever take over completely, and this includes both gas and electric ranges."

Jack Philips, Kansas City regional manager, Geo. D. Roper Corp., is explaining the features of the 1958 Roper Gourmet "Rotis-O-Grill" to Mrs. Dana Chase and Mrs. John Sincere. The "Rotis-O-Grill" has a thermometer for a spit and uses infrared burners.

MPM PHOTO

Infra-red heating does many jobs

two parts—part I contains basic principles on infra-red and part II contains specific information on types of infra-red heating equipment available, with photographs of typical installations

by John Sincere • TECHNICAL EDITOR

PART ONE

MPM EXCLUSIVE FEATURE

Infra-red heating for industrial use has, during the past twenty years, become a highly-efficient and dependable source for accomplishing many tasks requiring heat below 600° F. Degreasing, preheating of metals, removing moisture from metals, paint baking and drying, and porcelain enamel slip drying are some of the jobs that can be done rapidly and economically with a radiant source of heating.

As with many processes that are introduced with unintentionally-exaggerated claims, many misconceptions about infra-red have arisen, but have since been clarified by the engineers who have developed infra-red heating.

It will be the purpose of this article to clarify the subject by presenting some of the available technical information.

What it is

Radiant heat is produced by the infra-red portion or band of the wave spectrum, located between visible light and the microwaves used for high definition radars (See Figure 1). Infra-red radiation comes from molecular thermal action within any object whose temperature is above absolute zero (—459.4° F. or —273° C.). Infra-red radiation is not to be confused with "heat waves," the transfer of thermal energy by conduction or convection, although infra-red produces heating in any object it strikes.

Heating by conduction or convection requires a physical medium such as air or a liquid through which the heat can travel; infra-red energy can be transmitted through a vacuum as well.

Infra-red energy radiated by any object covers a wide range of frequencies, or wavelengths. The wavelength at which the maximum, or peak, radiation occurs is determined by the source's temperature. For example, peak radiation from an object at 1000° F. occurs at a wavelength of about 3½ microns. (A micron, equal to 1/10,000 of a centimeter, is normally used to express wavelengths in the infra-red region.)

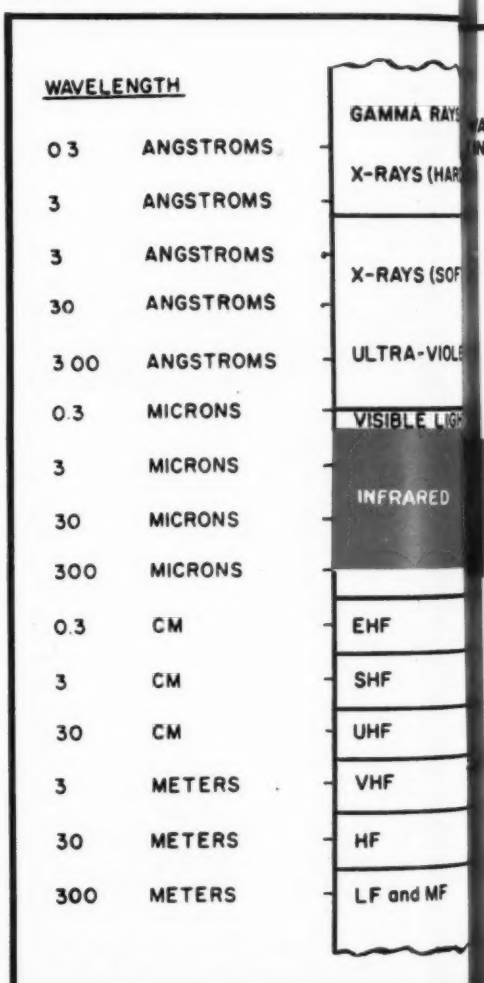
As the temperature of an object increases, its infra-red radiation characteristics change in two ways: peak radiation shifts to shorter wavelengths, and total radiated energy increases as the fourth power of the object's absolute temperature.

Commercially-used wavelengths

The commercially-used portion of the infra-red spectrum band is relatively small in comparison to the entire infra-red radiation band. The infra-red band exists all the way from the visible at approximately 0.8 micron to 400 microns. Wavelengths of the commercially-used portion range from approximately 1.3 microns to 2.8 microns. From this it can easily be seen that commercial infra-red heating is accomplished in a very small portion of the infra-red wave band. These wavelengths are the range of the peak radiation absolute temperatures produced by the commercially-available radiant heat sources in widest use at the present time. (Absolute temperature is degrees Kelvin which is equal to degrees Centigrade +273).

At 2500° Kelvin the tungsten filament lamp emits its peak radiation which corresponds to approximately 1.3 microns in wavelength. (See Figure II). The same tungsten filament lamp at half rated operating voltage emits peak radiation at approximately 1.6 microns at 1860° Kelvin. The incandescent ceramic burner operates at a temperature of approximately 1530° Kelvin and emits its peak radiation with a wavelength of approximately 2.0 microns. The electrical resistance-type heating elements operate in the vicinity of 1080°K. and emit peak radiation at about 2.8 microns. To further illustrate a point, the

FIGURE 1



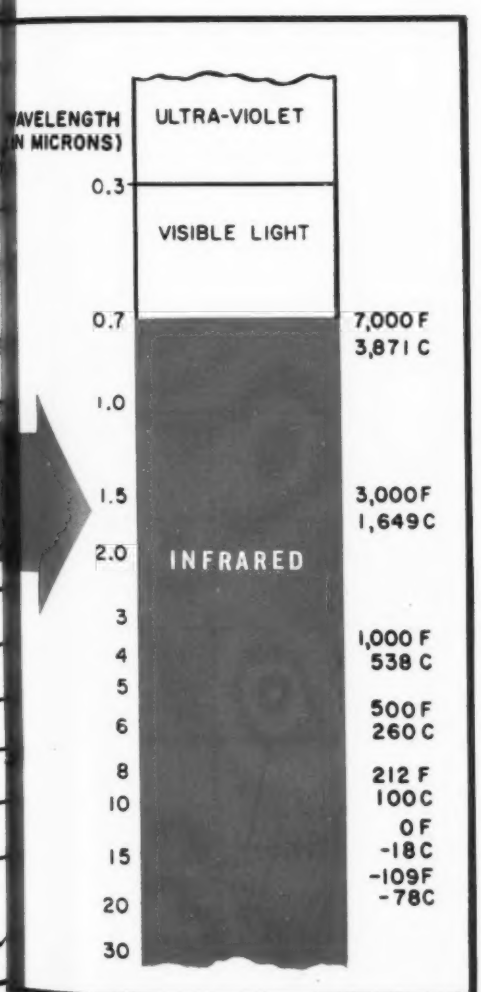
EDITORIAL NOTE: Technical information presented originated from such sources as Fostoria Pressed Steel Corp., Burdett Mfg. Co., General Electric Co., Edwin L. Wiegand Co., and Westinghouse Electric Corp.

human body at a temperature of 98.6° F. or 310° K. emits infra-red rays corresponding to a wavelength of about 10.0 microns.

Non-heating uses of infra-red

Infra-red detection devices and infra-red lenses for photography can be regulated to "see" objects at lower temperatures than red hot. In other words, the entire infra-red band of the spectrum is not used for industrial heating — only a narrow portion of it is.

This commercially-used portion of the band was divided into two parts, called "near" and "far," by technicians sometime during the development of radiation heating. These terms are misleading because some textbooks on the subject separate the infra-red band into three parts, namely: "near" infra-red from 0.7 microns to 1.5 microns; "middle" infra-red from 1.5 microns to about 5.5 microns, and; "far" infra-red from 5.5 microns to 400 microns. Others refer to the division simply thus: "near" infra-red as anything less than 4 microns, and "far" infra-red as anything greater than 4 microns. In this article, no distinctions will be made.



The probable reason for the division at 4 microns is because it corresponds to approximately 850° F. — the temperature at which the visibility of heated objects disappears. If there were any real need for a division between areas of the infra-red spectrum, there might be more justification for selecting 4 microns than any other point, largely on the basis of the absorption of water vapor in the air, and of glass. Glass lenses and prisms were employed to measure infra-red radiation, and the transmission factors for glass decreased fairly abruptly within the range from 3 to 5 microns, making it necessary to go to quartz in order to secure results. Also, the absorptivity of water or water vapor commenced to assume serious proportions within the same range.

In any industrial heating installation, regardless of whether it is primarily a convection or a radiant heating unit, both sources of heating exist. Infra-red radiation of some type or quality exists with any object at a temperature higher than its surroundings. Because of this, there is no commercial oven or furnace which is wholly radiant or wholly convective, but the separation between the two types comes in the wide percentage differences in each.

Incorrect early belief

In the earlier days following the introduction of electric infra-red heating by tungsten filament, one of the ideas that existed in connection with wavelengths of radiant heat sources was that a fundamental spectral frequency, based on resonance or its heating equivalent, existed for specific materials, and that extreme efficiency could be developed by providing radiation of exactly this frequency. However, it soon became apparent that, with any known method of producing heat radiation, the possibility of restricting it to a narrow band existed only through the use of filters. Since this was purely a subtractive process, about the only practical approach that ever was developed was the use of ruby glass to filter out the small proportion of visible light from the short end of the distribution curve.

An inspection of the distribution curves reveals that, for sources from 2,500 to 600 degrees Kelvin, there is a great deal of overlap between all temperatures represented. (See Figure II). Thus, if 4 microns were selected as the desirable frequency for a given operation, it would be found that three basic sources shown on the chart would yield approximately 5 per cent of their energy between 3.8 and 4.2 microns, and it would be necessary to waste 95 per cent of the radiated energy through some filter medium in order to achieve this type of distribution.

The matter of color differentiation has been a source of considerable study and a small amount of data concerning it is available. As the wavelength of the source grows longer, or the source temperature decreases, the source becomes less color sensitive. Available information indicates that, as the temperature of the source increases, the more essential the reflectivity of the interior walls of the oven becomes. In other words, the reflectivity of oven walls should be higher, say, for a 2500° Kelvin source than it would need to be for a 1500° Kelvin source. The exact reflectivities required for maximum efficiencies would vary depending on such factors as size and shape of the oven, processing temperatures required, and the absolute temperature of the source of radiant heat.

As the absolute temperature of the radiant source decreases, the greater is the effect of heating the air, as can be seen from Figure III. In other words, the 2500° Kelvin source heats objects more by direct radiation than a 1500° Kelvin source. The latter heat source temperature becomes more of an air heater, causing a greater proportion of convection heating than the former.

Earliest lamp heat source

Perhaps it will be valuable here to review the various types of radiant heat sources from the standpoint of development through the years, and also the most widely used applications of each. The earliest commercial lamp installation involved the carbon filament lamp at approximately 2000° Kelvin. Since almost 75 per cent of its energy was

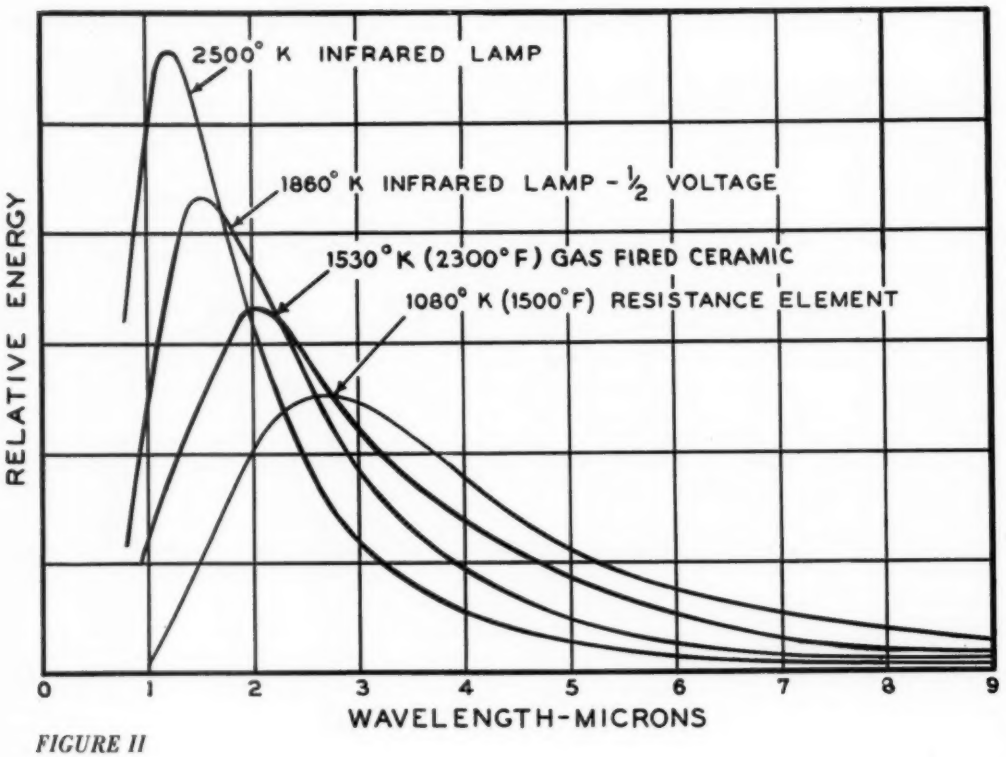

2500° K INFRARED LAMP
1860° K INFRARED LAMP - ½ VOLTAGE
1530°K (2300°F) GAS FIRED CERAMIC
1080° K (1500°F) RESISTANCE ELEMENT
RELATIVE ENERGY
0 1 2 3 4 5 6 7 8 9
WAVELENGTH-MICRONS

FIGURE II

radiated in the region below 3 microns, it became practical to enclose it in a glass enclosure which protected the source from serious convection loss. For manufacturing and procurement reasons, as well as a longer life, the principal commercial source was shifted to the tungsten filament at 2500° Kelvin. It is still the principal type of lamp heat source being used today.

Lamps improved

The principal drawback to the use of lamps developed from the relative fragility of a glass envelope and its limited resistance to mechanical and thermal shock. Many people built their own ovens, using materials at hand and guided by little or no experience. Under these circumstances, the failures of lamps were sometimes quite pronounced, both from the standpoint of accomplishing the end result, and from the standpoint of showing any appreciable life. As the users become more educated in the proper use of radiant heat lamps, and the manufacturers of the equipment formulated rules for their use, this difficulty was overcome to a great extent.

Quartz lamp

A durable enclosure for the tungsten filament source is the quartz tube. Because of the physical properties of this material it is quite resistant to mechanical shock. It also possesses extremely-good thermal shock characteristics. The quartz can be almost white hot and be suddenly immersed in cold water without breaking.

One of the best applications of the 2500° K. source is in installations requiring zones of different heat levels in processing. Voltages can be varied quickly and adjusted to conditions.

Nickel-chrome alloy heater

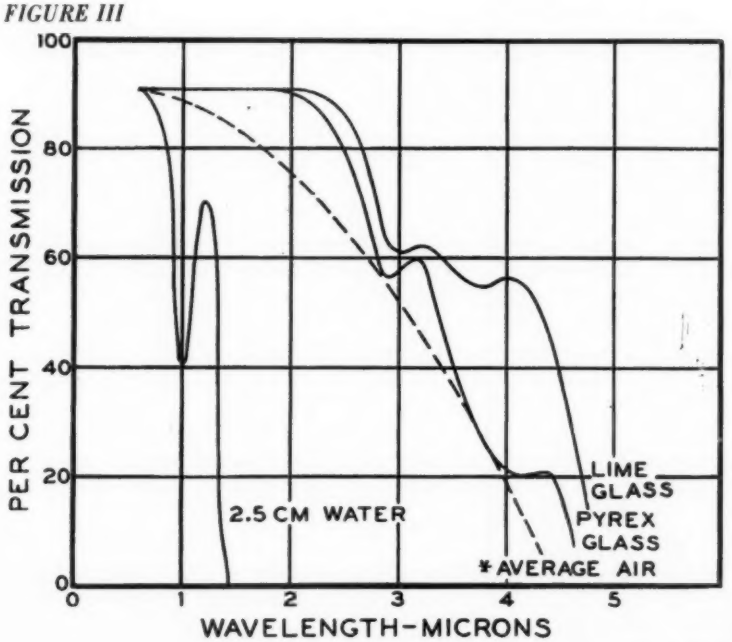
The metal sheath electric heater operating in the range of 1100 to 1000° Kelvin (about 1500° F.) introduced an infra-red source that resists abuse because of its nickel-chromium alloy construction. These elements are made in the form of ribbons or coils encased in metal tubes. Because of their mass, they are less responsive in speed of heating when initially turned on than higher temperature sources, but they impose a relatively-smaller problem in starting loads. Being lower temperature sources, the metal sheath heaters produce more heating by convection since air is heated more readily by longer wavelength sources. In a properly designed oven this effect can be utilized to advantage.

Refractory gas burner

The refractory or ceramic gas burner is generally used in oven installations where some degree of convection heating is desired. The temperature of this radi-

to Page 41 →

FIGURE III

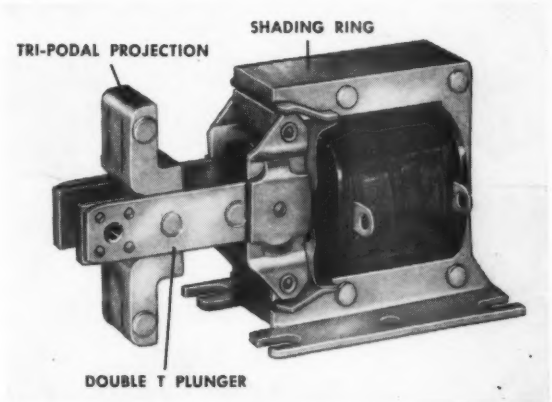


SORENG

Control Engineering Bulletin

creative controls for creative industries

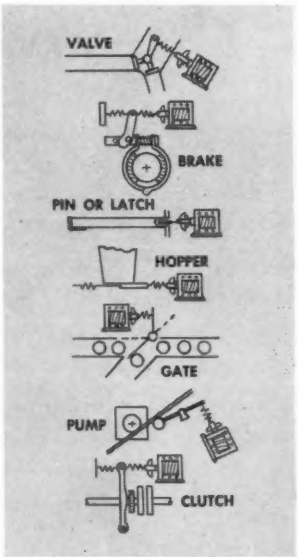
NEW SORENG DOUBLE T DESIGN SOLENOID PACKS MORE PULL FOR MORE APPLICATIONS



The inherent design superiority of Soreng double T (TT) solenoids makes the big difference. Exclusive double T plunger construction results in more pull at point needed. For constant or intermittent duty. And Soreng solenoids are more efficient — thanks to stable tri-podal seating and tightly locked shading rings.

These features are custom-built in four sizes offering 12 stock solenoid models. Available in 110 V and 220 V. They satisfy virtually any application at production run prices.

USE DOUBLE T SOLENOIDS IN APPLICATIONS SUCH AS THESE



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2. Clutch operation — electro-magnetic clutches
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7. Interlocks — automation
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proves its case!

You just can't beat the combination of scientific research and genuine practical experience . . . and that's exactly the combination which is producing superior Frits for Ing-Rich customers.

It should be of significant importance to you that our ceramic engineers have the rare advantage of daily contact with our large enameling plant where we both enamel our own products and do a very large job enameling business.

Ing-Rich ceramic engineers have the answer to *your* Frit problems because they have added practical "know how" to their scientific training.

INGRAM-RICHARDSON, INC.
OFFICES, LABORATORY AND PLANT
FRANKFORT, INDIANA

Infra-red heating

→ *from Page 38*

ant heat source is 1530° Kelvin or 2300° F. The type burner used is such that the flame produced by the burning gas is forced to impinge on the surface of the refractory portion of the burner causing it to emit infra-red rays. These special burners are designed in either of two ways to gain this effect. One design is in the shape of a grooved trough, through which the burning flame is forced, causing the refractory to emit infra-red waves. The other design is simply a concave cup refractory, shaped in such a way that the burning flame is forced to impinge across the entire face of the refractory, thereby causing the refractory's surface to emit infra-red rays.

The 100-per cent primary air for the combustion of the gas is premixed before reaching the burner, hence does not burn air from the atmosphere of the oven. In properly-designed systems utilizing this type of infra-red source, convection heating is employed to a greater extent than with the 2500° K. source. One of the advantages of this heat source is that, because of the complex combustion of the gases at the burner, and the "open" incandescense of the heat source, volatiles from the process are partially "incinerated" before they are drawn off by the exhaust system.

Refractory burners operated at 1600° F. (about 1150° Kelvin) are used in certain cases for industrial applications but mainly for space heating.

Infra-red has established a definite and lasting place in industrial heating due to the great strides in development that manufacturers have made. It possesses properties which are quite desirable in some instances, and it can compete successfully in many processes. A wide variety of generating sources are available, and valuable properties can be attributed to all of the units.

The discussion in this article was applied to radiant heating at temperatures below 600° F. It should be mentioned that much work is being done at the equipment manufacturing level to develop sources that will be efficient and dependable for temperatures up to 1000° F. and higher.

Next Month
Part II

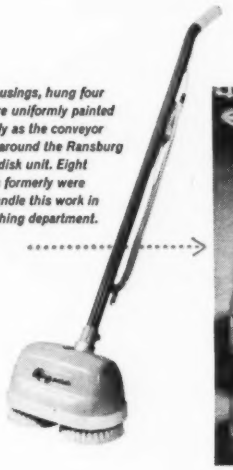
An outline of the practical applications for infrared industrial heating in appliance and other metal products manufacturing plants, and a number of photographs of actual installations.

Regina

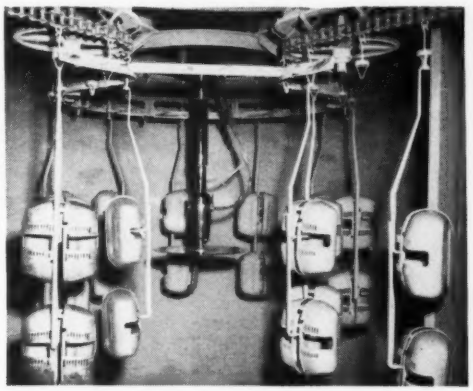
Reports 50% Paint Saving with RANSBURG NO. 2 PROCESS

Electrostatic Spray Painting

That's because Ransburg No. 2 Process puts the paint on the product instead of up the stack



Aluminum housings, hung four to a fixture, are uniformly painted electrostatically as the conveyor makes a loop around the Ransburg reciprocating disk unit. Eight hand sprayers formerly were required to handle this work in Regina's finishing department.

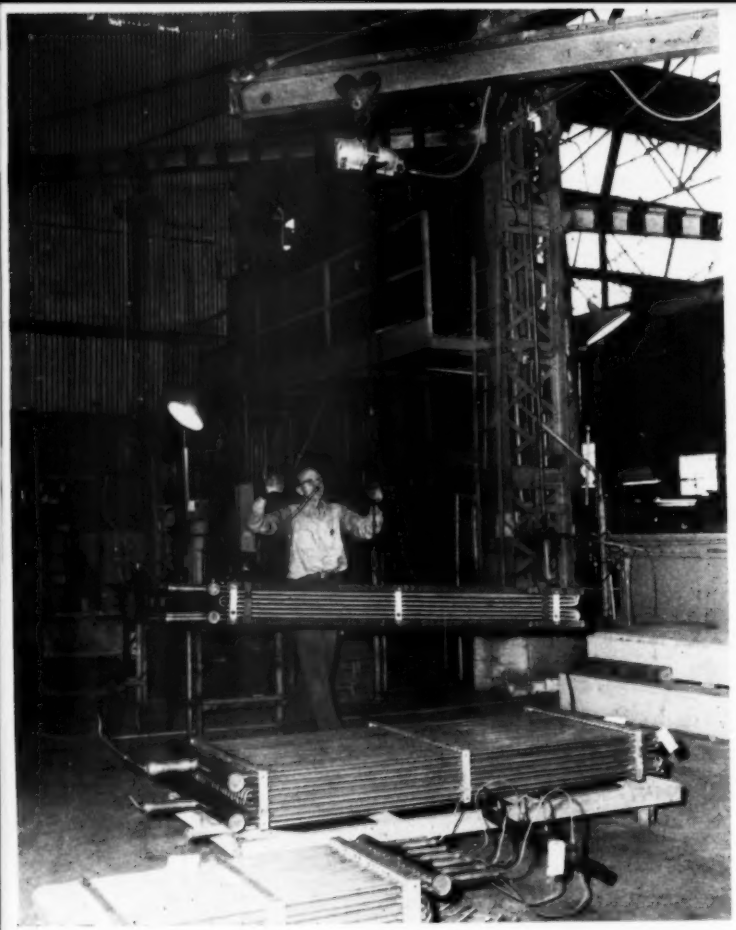


The Regina Corporation, Rahway, N. J., replaced hand spray with Ransburg No. 2 Process to paint their twin-brush Floor Polisher and Scrubber, and their Electrikbroom.

Now, a single reciprocating disk unit automatically handles the work which formerly required eight hand sprayers. Even with increased production, Regina is using 50% less paint. Quality of the work is improved with maximum uniformity on all parts.

NO REASON WHY YOU CAN'T DO IT, TOO! Want to know what Ransburg No. 2 Process will do for you in your finishing department? If your present production justifies conveyorized painting, let us prove the many cost-saving benefits which can be yours. Write for our No. 2 Process brochure which pictures many on-the-line examples of electro-coating on a wide variety of products, and describes our free survey service.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana
RANSBURG



A swinging jib crane handles a large air conditioner component to and from the cleaning tanks. The jib cranes are so located that they can serve two or more production lines.

Better material handling improves production efficiency

plant re-arrangement, cranes, and belt and roller conveyors combine with automatic presses and slitters to present air conditioner manufacturer with sixty-per cent reduction in handling cost

by Gilbert C. Close • WESTERN EDITOR

MPM EXCLUSIVE FEATURE

A sixty-per cent reduction in material handling costs, and this despite the fact that production was increasing at the same time, is an accomplishment any firm would be proud to announce. Add to this the simultaneous accomplishments of smoother and more efficient production line operation, more efficient use of shop floor space, more efficient use of labor, and a sharp reduction of the in-plant accident rate, and the sum total adds to what was accomplished by Drayer-Hanson, a division of National-U. S. Radiator Corporation, Los Angeles, during a two-year program aimed at increasing overall plant efficiency.

As Drayer-Hanson is one of the largest producers of air conditioning equipment west of the Mississippi River, the program represented no simple task. It was further complicated by the fact that about 60 per cent of the products are custom made, and therefore do not easily lend themselves to flow-line production techniques.

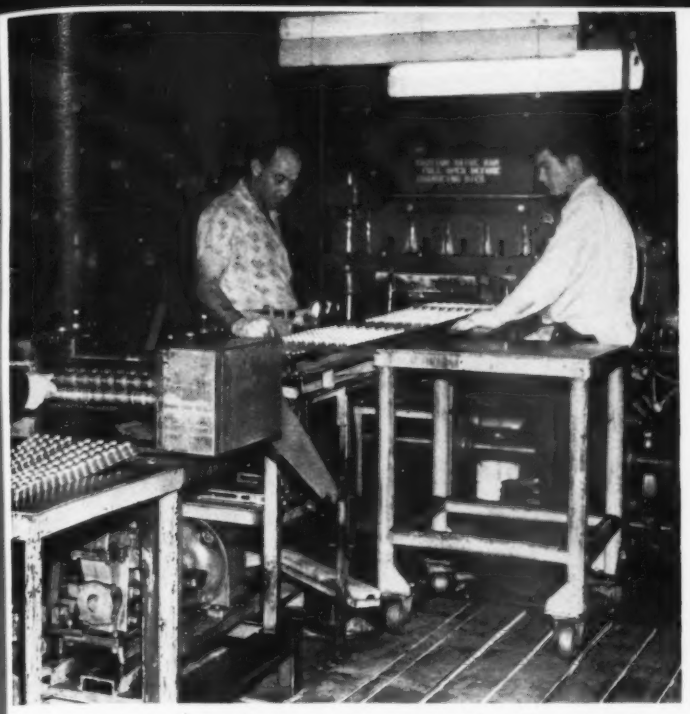
"One of our biggest problems was to transform a number of in-plant job shop-like activities into some semblance of a production line operation," said Fred Savaglio, plant supervisor. "This looked hopeless at first, but after some study of the situation, it became more and more apparent that revised and improved material handling techniques could trigger our entire plant improvement program."

A "brute force" operation

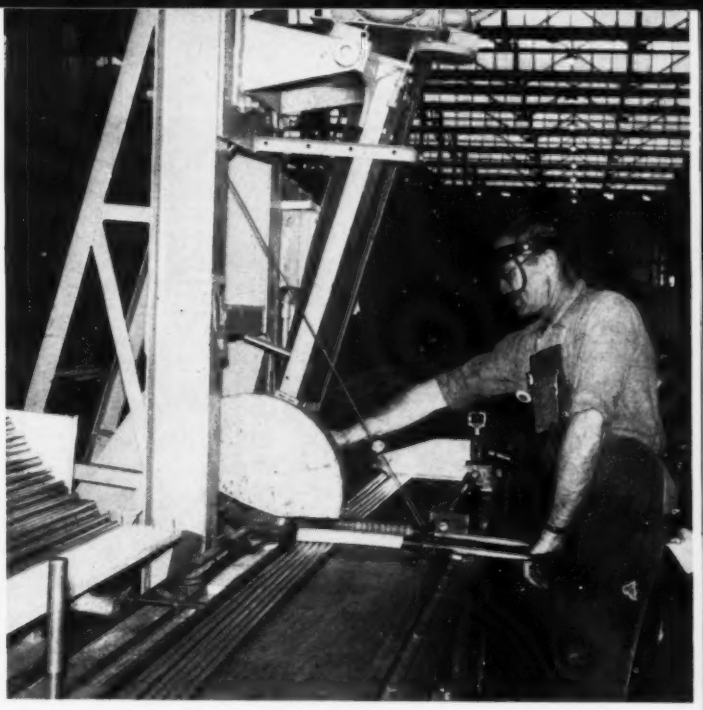
As Harold T. Hunt, general manager of Drayer-Hanson explains it, material handling throughout the plant, prior to the improvement program, was pretty much of a "brute force" operation. Raw stock, aggregating an average inventory of 600 tons of sheet steel and 30,000 lbs. of copper tubing, was unloaded and stored outside the plant. Three full-time employees, utilizing jeeps and lift trucks, were kept constantly busy transporting this material into the plant and to the area where it was needed. Wide aisles utilizing excessive floor space had to be kept open for this sort of handling. Continual manual lifting, loading, and unloading of the stock contributed to a high accident rate.

The handling of in-process parts was just as cumbersome. The parts were placed in boxes, then the boxes had to be transported to the area of the next operation. Proper scheduling of such a handling technique was impossible. An assembly line shortage of a part might occur, while in another part of the plant the same part might be building up in an in-process accumulation. During boxing, transportation of the boxes, and unboxing the parts, damage was common, especially to fragile sheet metal forms and the soft copper tubing. Rejections ran high.

"It was evident from the first that improved material handling techniques



Automatic press (background) accepts wide roll stock and perforates it in fin tube patterns. Slitter in center foreground slits stock to proper tube fin sizes. This setup resulted in a 50-per cent material saving.



Sawing copper tubing to production lengths. Due to its fragile nature, tubing is not "unboxed" until it reaches saw table (left). The solenoid-operated size gate beyond saw opens automatically, and cut tubing is belt-conveyed to table for next operation.

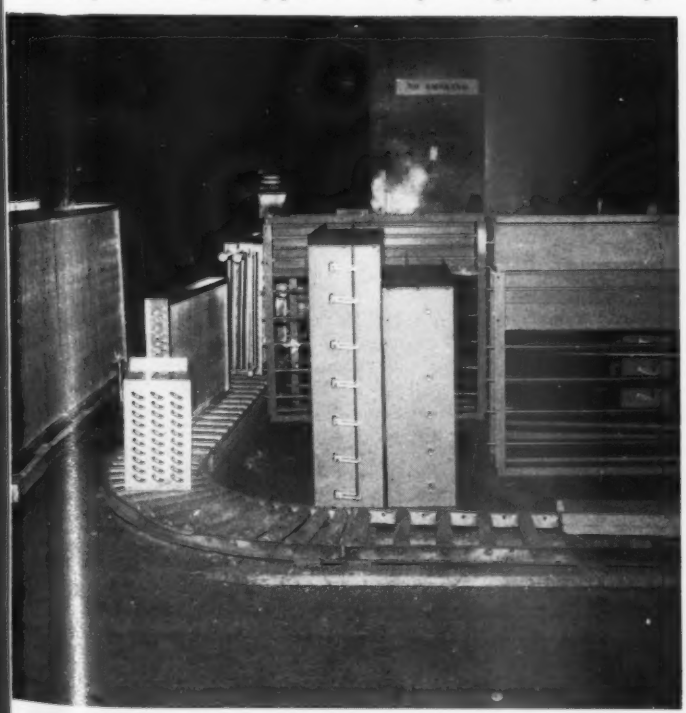
would require a re-arrangement of plant production facilities," Savaglio says. "One would have to supplement the other."

After considerable planning, the production machines were finally arranged in an order to produce a straight-flow production line for each component or group of components that went into the assembly of an air conditioning unit. These various production lines, along with the final assembly lines, were situated in specific building bays so that an overhead traveling crane could serve their entire length.

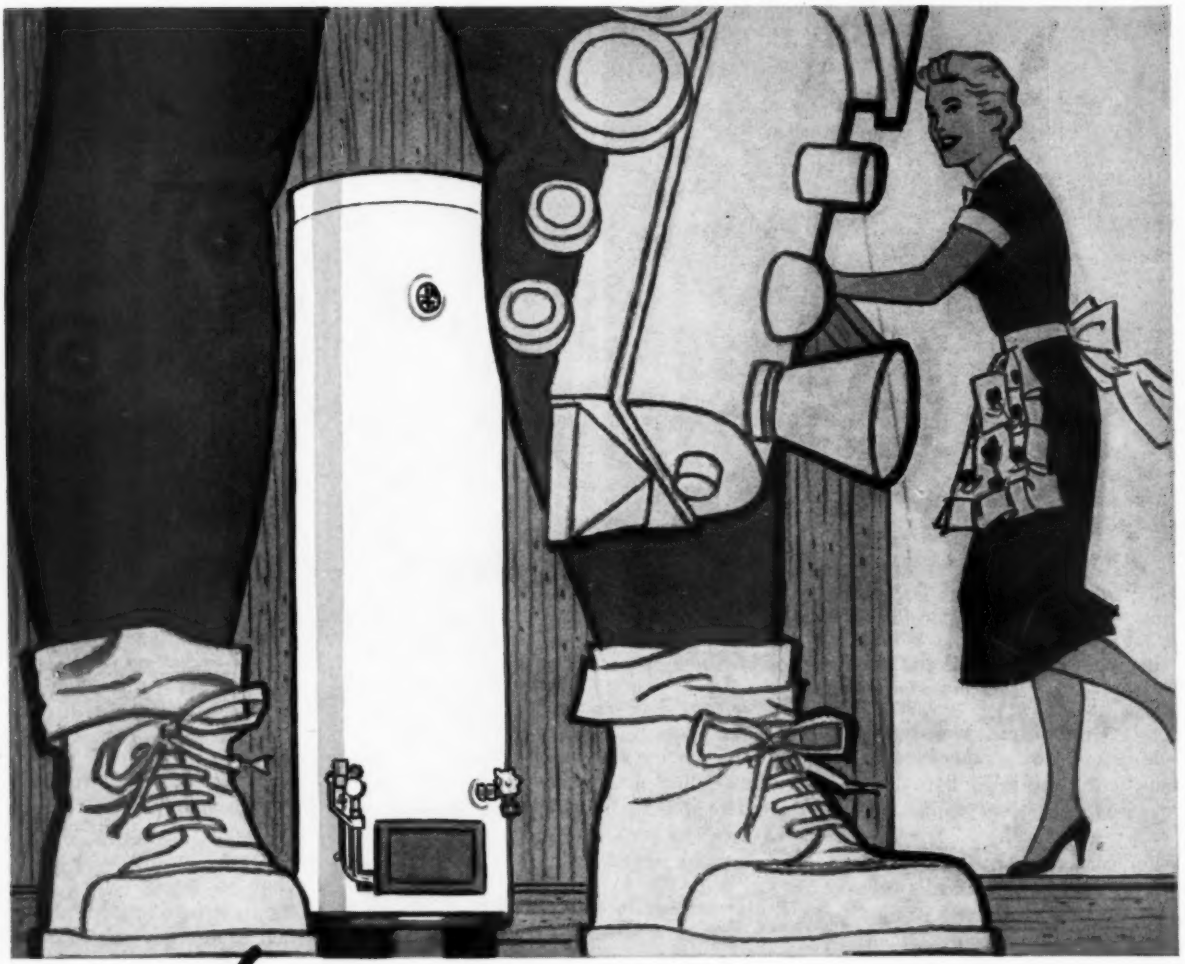
Roller conveyors and tiered storage racks installed

The next step was to plan and install, wherever possible, roller conveyors so that parts would travel automatically from one production operation to the next. This virtually eliminated the old "box" method of handling in-process parts, and went a long way toward minimizing line shortages caused by not having the right part in the right place at the right time. The roller conveyor technique of handling was carefully designed to keep parts moving until they

Floor-level roller conveyor handles air conditioner assemblies into a paint booth. This is a part of the handling theory at Drayer-Hanson; "Keep parts constantly moving. Avoid pile up!"



Pallets designed for easy lift truck pick up have replaced the old "box" method of handling parts at points where roller or belt conveyors cannot be used.



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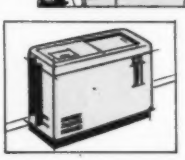

Business machines . . . Commercial refrigerators . . . Kitchen cabinets . . . Home freezers . . . look best, wear best, SELL BEST with a porcelain enamel finish.

were completed and ready for the assembly line.

At points where, for one reason or another, the parts could not be moved onward by roller conveyor, tiered storage racks or bays were erected for temporary storage. These racks are coded and numbered so that a wanted part is easily located, and because they are tiered one above the other, a considerable amount of floor space saving is realized.

While making these production line changes, considerable thought was given to new tooling that might improve some facet of production, or eliminate waste. As an example, the punch presses now used in the coil manufacturing departments are automatic. They are not only equipped with belt conveyors to expedite handling, but also with new adjustable dies, coordinated with slitters so that several fin sizes can be produced simultaneously from a single width of rolled sheet stock. As a result of these improvements, and in addition to automatic handling, waste was reduced 50 per cent.

New raw material handling

After the individual production lines were set up and a material flow pattern established on each, the handling of raw stock was revised accordingly. During the layout of each line, storage space was reserved for the raw material that would be used on that line. Now, instead of unloading the raw stock outside for a second handling into the plant, it is transported directly from the incoming carrier to its storage space near the head of the production line on which it will be used. Thus, sheet metal is stored near the sheet metal department; roll fin stock at the head of tube sheet and fin line; and copper tube stock directly on the tubing production line. In fact, because of its susceptibility to injury, the incoming copper tube stock is not even unboxed until it has been placed on the receiving table of the saw that will cut it to proper production lengths. Beyond the saw, the cut copper tubing is belt conveyed to a waiting table for the next operation.

Another great saving in handling accrues from the way the various air conditioning unit components are handled when they leave their various production lines. They are not delivered en masse to the assembly department. Rather they are segregated according to the assembly sequences, then delivered to points along the assembly line where they will be installed. As yet many of the components to be assembled are stored in the tiered racks already mentioned, but mezzanine storage space is being installed to further conserve floor space. The components will feed from the mezzanine to the assembly floor on roller conveyors.

In the new plant layout, every effort was made to arrange every facet of production in normal sequence so that in-plant transportation from department to department could be minimized. During assembly, inspection facilities are provided along the assembly line so that the required inspections can be made as the assembly passes.

In several cases, a single installation, such as a paint booth or cleaning facilities, is made to serve two or more component production lines. In these cases a jib crane, which can be swung over the various lines being served, is used. The jib crane merely picks up the part, swings it into position for cleaning or painting, then returns it to its own line where it can continue its normal flow toward completion.

The final assembly lines culminate in the packing and crating department. Here, large units that must be crated are bolted to a crate base, then proceed onward for finish crating. There is no noticeable interruption between the final assembly line and this crating operation. Beyond the crating department, the units move into the shipping department.

During the plant improvement program, Drayer-Hanson engineers managed to blend material handling with production. What formerly was a distinct material handling problem, such as moving boxed parts from one production location to the next, is now accomplished by a roller conveyor which receives the parts from one machine and feeds them automatically to the next. Inspection used to be a separated operation with material handling problems of its own. Today, inspection is accomplished at the required places along the assembly line.

With 60 cents being saved out of each dollar once spent for direct material handling, Drayer-Hanson officials are well pleased with the end result. They are saving money, man hours, and materials.

EXCLUSIVE MPM PHOTOS

Roller conveyor passes through inspection booth along final assembly line. When products reach the end of the assembly line, they are already inspected and ready for crating.

Another Story of

PRESCOTT 8-0800

THE MACCO PRODUCTS COMPANY
9210 S. SANGAMON ST., CHICAGO 20, ILLINOIS

JANUARY 10, 1958

DANA CHASE PUBLICATIONS
ELMHURST NATIONAL BANK BUILDING
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GENTLEMEN:

WE HAVE USED YOUR PUBLICATION ON A MONTHLY BASIS FOR THE PAST EIGHT YEARS, AND WE ARE WRITING AT THIS TIME TO TELL YOU OF THE SPLENDID RESULTS WHICH WE HAVE ACHIEVED.

WE ORIGINALLY SELECTED YOUR PUBLICATION AS AN ADVERTISING MEDIUM FOR ONE SECTION OF THE METAL PRODUCTS INDUSTRY, AND IT WAS INTERESTING TO NOTE THAT, DURING THE FIRST YEAR OF ADVERTISING, OUR SALES TO THIS SECTION OF THE INDUSTRY MORE THAN DOUBLED.

SINCE THEN WE HAVE CONTINUED TO USE YOUR BOOK FOR ALL OF OUR PRODUCTS (DRAWING COMPOUNDS, METAL CLEANERS, PHOSPHATE COATINGS, ETC.) BECAUSE WE HAVE FOUND THAT WE ARE REACHING THE TYPE OF PERSONNEL THAT WE WISH TO REACH IN THE ENTIRE FABRICATED METAL PRODUCTS INDUSTRY.

OUR AGENCY HAS PREPARED A SPECIFIC PRODUCT TYPE OF ADVERTISING FEATURING PRODUCTS BY NUMBER OR NAME. THEREFORE WE HAVE BEEN ABLE TO MEASURE OUR LETTER AND PHONE RETURNS AND RESULTING BUSINESS FROM INDIVIDUAL ADS, AS WELL AS JUDGE THE OVERALL EFFECTIVENESS OF THE PROGRAM.

WE ASSURE YOU THAT WE INTEND TO CONTINUE OUR ADVERTISING PROGRAM IN MPM.

VERY TRULY YOURS,

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The first year Macco used the program to reach one specific section of the metal products industry. During this first year of advertising, sales to this section of the industry more than doubled.

During the fifth year Macco directed most of the monthly campaign to rustproofing and paint adhesion materials, with a valuable increase in sales on these items.

During the sixth year *a single advertisement* resulted in the shipment of nine tons of a new material, within one week after the first advertisement appeared.

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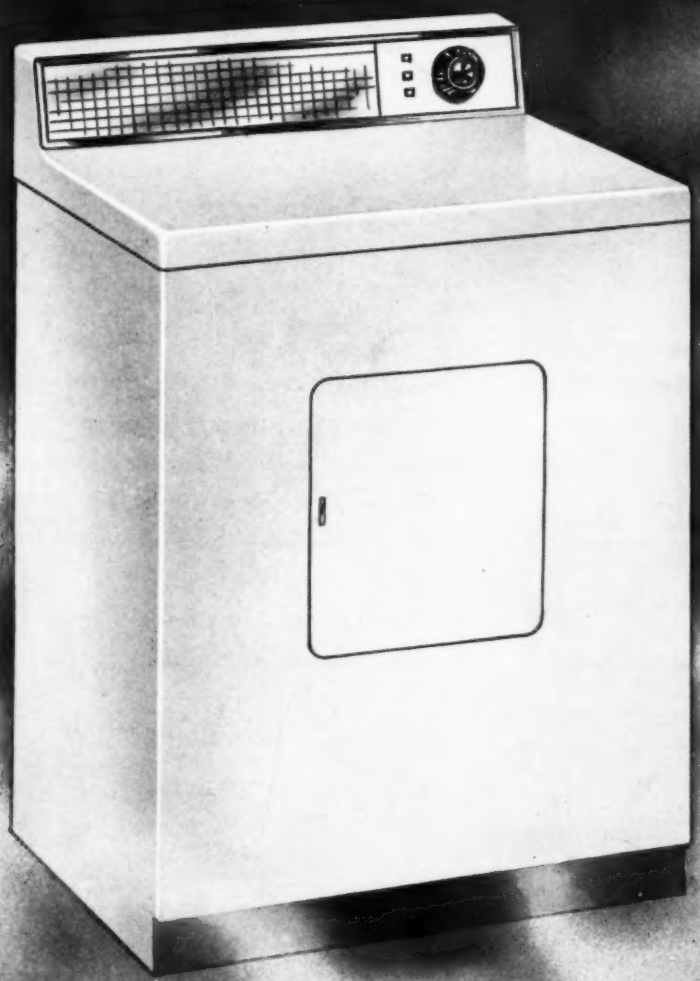

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Correlation of laboratory and service tests

a laboratory test that gives an indication of what might be expected of porcelain enamel in a lifetime of use

by J. S. Wicks
GENERAL ELECTRIC COMPANY

Figure 1

CORRELATING laboratory tests with service is at best a difficult assignment since very few complaints are ever received from the field due to corrosion of porcelain enamel.

However engineering life tests on actual combination washer dryers using standard wash loads, hot water and detergents provide a fair approximation of the durability of the porcelain enameled parts. These tests are run continuously to approximate 10 years life if the machines are used daily, or nearly so.

For the combination washer dryer, the engineers feel that 7000 hours approximates 10 years life. This, of course, is due to the long drying time as well as the wash cycle required.

This article will discuss a laboratory test that has proven to be a good indication of what we might expect on life test. It is our version of the steam condensate test.

Steam condensate test

About two years ago, we at G. E. and practically all makers of combination washer dryers realized we had a problem. The porcelain enameled parts in alkali resisting ground coat began to corrode excessively after only several hundred hours of life test. These corroded areas were confined to those in which a great deal of condensation was formed during the drying cycle.

Figure 1 shows a combination washer dryer door liner that had failed after only 450 hours or 7 months of equivalent life.

Figure 2 shows a section from the combination tub near the condensing water pump which was removed from a machine after 1500 hours or about 2.1 years of equivalent life.

Figure 3 shows a tapered section of a badly corroded door liner after 3227 hours life test or 4.6 years equivalent life. None of the machines from which these samples were taken had used detergents or bleach in the wash water. These materials increase the corrosion attack, as might be expected.

In order to get out of the problem, we began using a hot water tank enamel as a second coat over the alkali resisting ground coat. It was found necessary to fire the appearance item, the combination door liner, three times to sufficiently burn down the harder hot water tank enamel. The tub was given only two firings, one in alkali resisting ground coat and the other in hot water tank enamel. Double and triple firings were costly and inconvenient.

In order to check the steam condensate corrosion without resorting to life tests, we developed the steam condensate test equipment as shown in Figure 4. As you see, it is composed of two 3" diameter bent Pyrex tubes with the sample held vertically between the tubes. The tube on the left has one closed end to hold the boiling tap water. To it is connected a reflux condenser to maintain the water level. The tube is heated by two 192 watt heating tapes connected in parallel to a variac to control the amount of boiling. The steam generated is condensed on the porcelain enameled plate suspended vertically between the tubes. This allows the condensate to form and continually run off and drip back into the tube.

100 hours testing time

The tube at the right, or rear, is open at both ends and is filled with tap water. A piece of foil separates the back side of the porcelain enamel sample and the open end of the tube. By means of a 192 watt heating tape connected to a variac, the temperature is maintained between 185 and 190°F. We have found by tests on a prototype model that this temperature not only represents the actual conditions inside the washer dryers, but also the rate of corrosion is the highest. Above 200°F no condensate formed and consequently no corrosion occurred. We have arbitrarily selected 100 hours as the testing time. Samples 3½" x 4" are weighed before and after the test in the usual manner and milligrams loss per square inch is recorded.

We have a bank of three tests which are run concurrently for the same lot of samples. An average of the three is judged representative of a given enamel. Reproducibility of corrosion is excellent if temperature and rate of boiling is maintained constant.

We have used the steam condensate test to evaluate softer hot water tank

Figure 2

enamels, vapor resistant overspray enamels and various vendor's alkali resistant ground coats. We have found that the three fire hot water tank enamel had a loss of approximately six Mg per square inch at the temperature and time our production facilities permitted.

We were able to show that a two fire softer hot water tank enamel had slightly less loss and thereby should perform equally without the necessity of refiring the door liner the third time.

No second fire for some parts

We were also able to indicate that a vapor resisting overspray had nearly the same properties as the old three fire hot water tank enamel. We therefore now have non-appearance tubs on life test with this enamel to prove to our satisfaction that we can eliminate the second fire for such parts.

We have also determined that alkali resisting ground coats may be judged as to solubility by their steam condensate corrosion. By test and judgment, we have set 12 Mg loss/sq. inch as the maximum allowable when checking out vendors' products. This is used in conjunction with PEI, and other alkali tests to determine suitability of ground coats for our products.

Rust sometimes never occurs

The washer dryer corrosion problem is still with us, however, even using hot water tank enamels. We have extended the life expectancy considerably, but gloss loss is very much in evidence after only 1000 hours or 1.3 years equivalent life. Rusting and consequent failure does not occur until after 7 years equivalent life and sometimes not at all.

Figure 5 shows a door liner now on test with 3500 hours or approximately 5 years equivalent life. As you see, we have lost gloss, but no rust is apparent. This washer has used detergents, bleach and a standard 6 lb. clothes load throughout the test.

Another view, Figure 6, shows a door liner from a washer that has been through the 7000 hour test. It does show some slight rusting, but is still in better condition than those with only

Figure 3 ▶

Figure 5 ◀

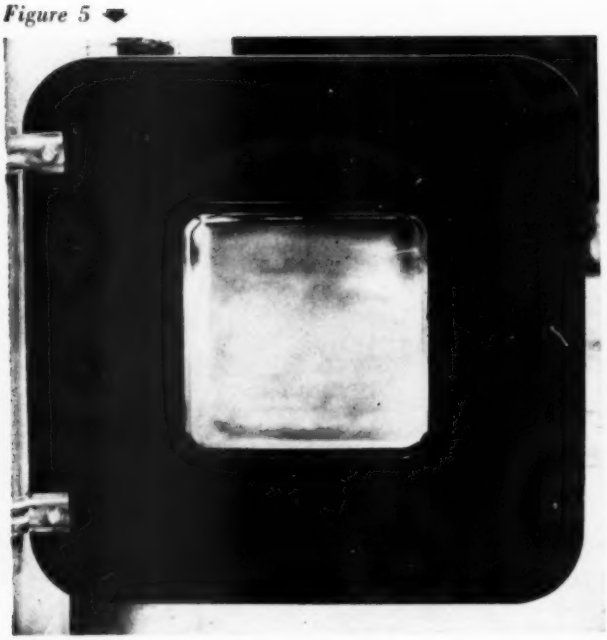
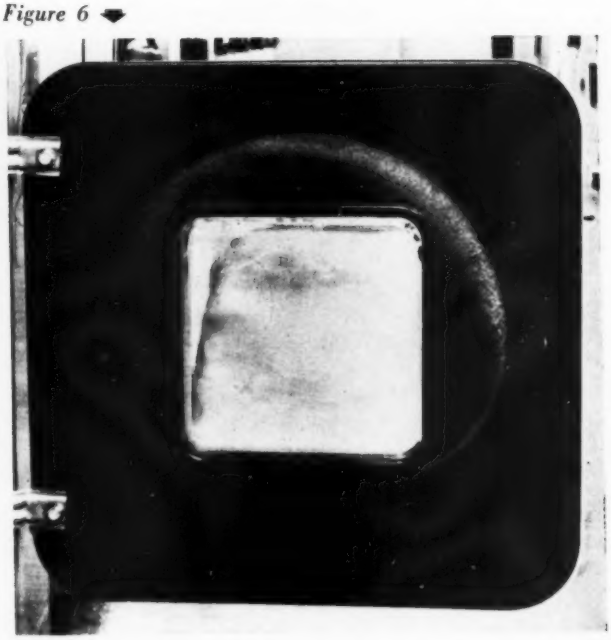


Figure 6 ◀



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Q. A zinc-coated steel that won't peel or flake? That could save us a lot of money every month. Just what makes this Weirkote so special?

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Search for the "unknown" starts in the SPECTROGRAPH where powder-fine particles of the material under study are burned at 4,000 to 6,000° centigrade and photographed for analysis.

The DENSITOMETER permits a quick "reading" of the photos identifying *all the elements* present in the material.

Materials of crystalline character are studied with X RAY to determine the form and combination of elements.

Final *quantitative* analysis is made in the LABORATORY and the "unknown" is now fully identified.

Finding "unknown" needles in haystacks

FERRO

In a day or two, instead of weeks, Ferro technicians are able to dig out hidden troublemakers you may be encountering in your porcelain enameling operation.

Ferro testing facilities and skilled personnel are also vital factors in the development of new porcelain enamels, new production processes, and in maintaining the consistent high quality of Ferro materials—all important to *you* in producing better goods at lower costs.

How and when can we help you produce better porcelain enameling . . . *more profitably?*

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500 hours using an alkali resisting ground coat. This washer also had detergent, bleach and a standard clothes load throughout the life testing period.

Figure 7 indicates by an empirical curve the correlation between the laboratory steam corrosion test and life testing of a combination washer dryer under actual operating conditions. This curve has far too few points to be entirely accurate, but the rate of corrosion versus milligram loss is essentially correct. As you see, we still need a better corrosion resistant porcelain enamel to lick steam condensate corrosion completely. We feel that with a standardized test procedure, such as our steam condensate test and future developments of new frits, this problem will be solved.

Adapted for METAL PRODUCTS MANUFACTURING *from a paper presented at the 19th Annual Shop Practice Forum of the Porcelain Enamel Institute, Columbus, Ohio, November, 1957*

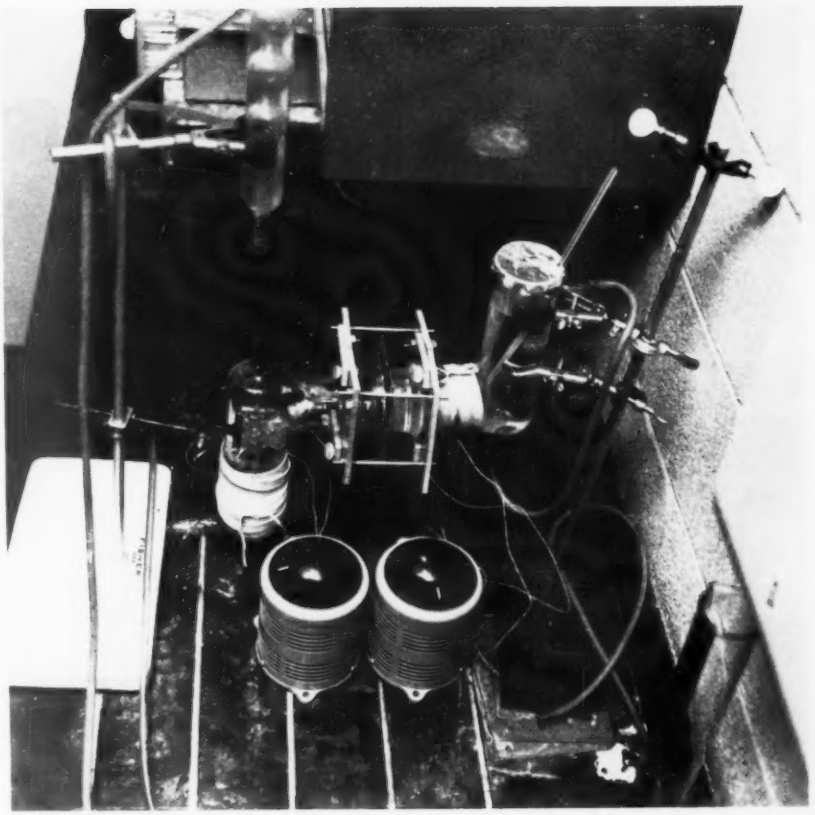
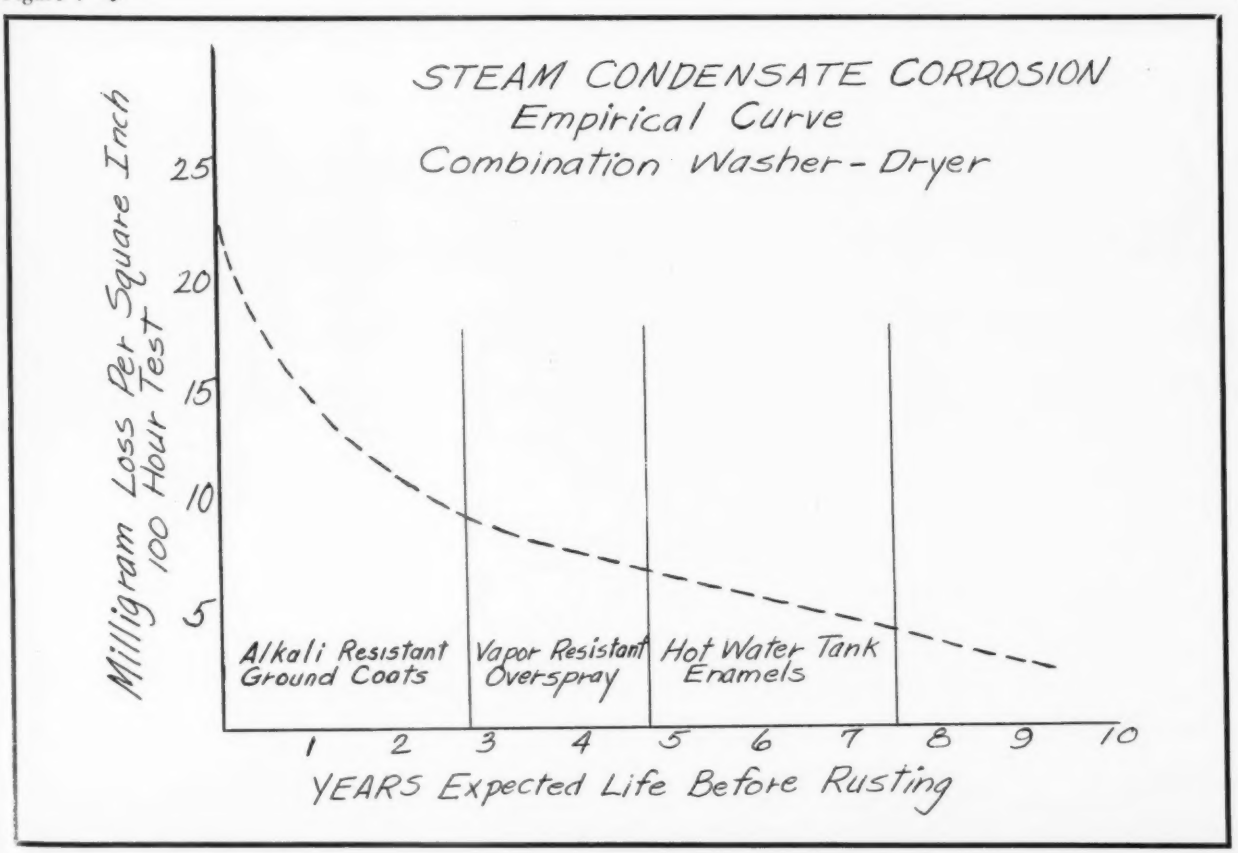


Figure 4 ▲

Figure 7 ▼



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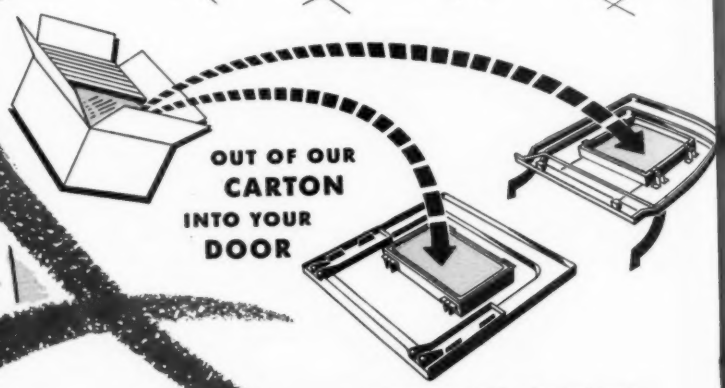

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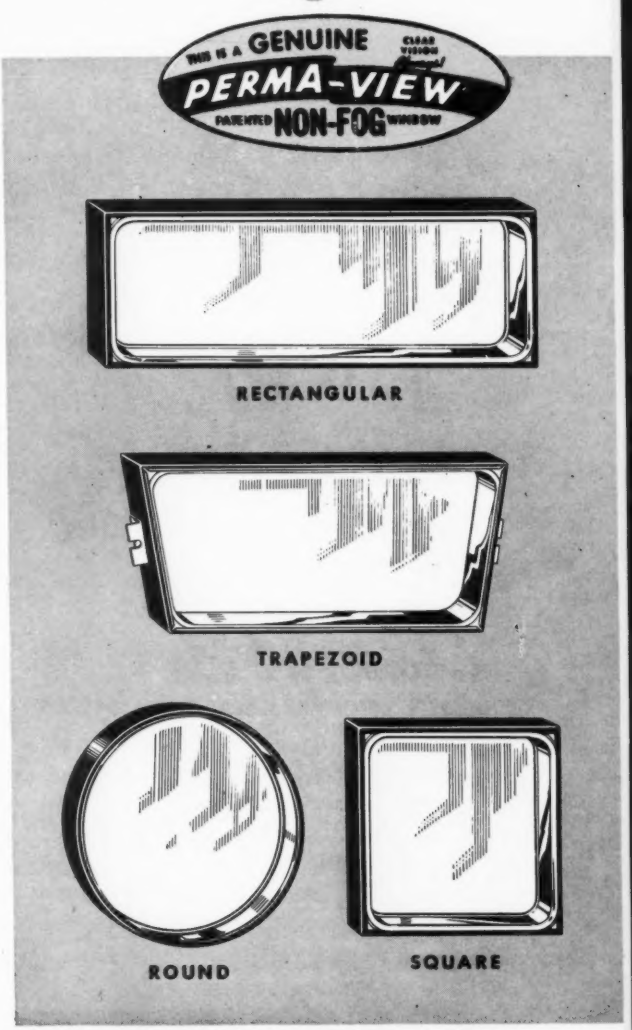

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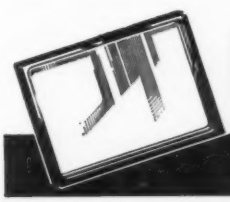

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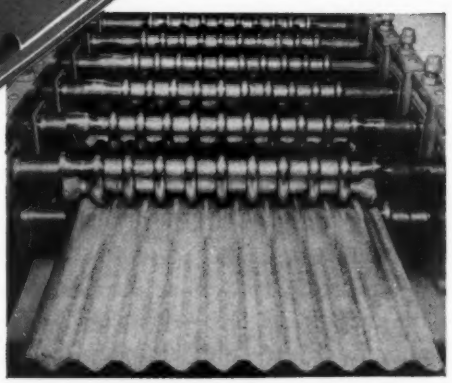

This setup is available as an individual unit for feeding sheets as illustrated; with a complete Dahlstrom Decoiling and Shearing Line conveying cut lengths into forming machine; or as a complete roll-forming line utilizing coil stock and cutting to length after forming.

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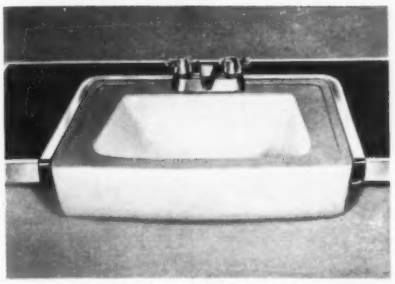
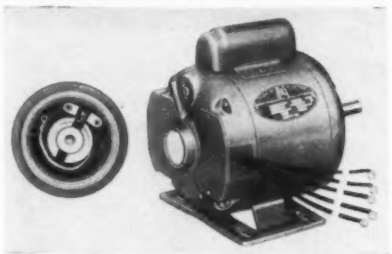


A new stainless steel or aluminum 3-sided frame and joiner strips employing all the clamp-down features of the ARDEE frame has been introduced. This is a frame made specially for American Standards new Dresslyn Lavatories F110 and F111 designed for counter top installation.

These new frames may be ordered with the Dresslyn Lavatory. For further information contact, Dept. MPM, ARDEE Frames, 295 Fifth Ave., New York 16, N. Y.

Instant-Reversing Unit for Electric Motors

An instant-reversing mechanism for electric motors represents a radical departure from conventional reversing switches, according to the manufacturer.

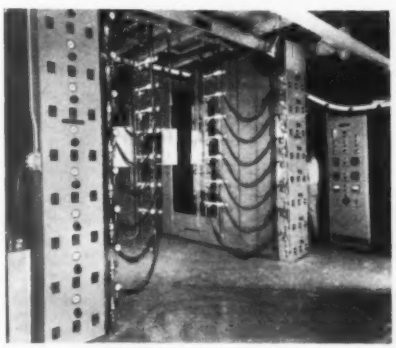


Called "Inst-o-verse," the device is available with single-phase, 1725 rpm, 115 or 230-volt sleeve or ball bearing motors from 1/6 through 1-hp ratings. The manufacturer states that energizing for reversal is instantaneous because the device's low-friction nylon shoes fitted to a machined surface on the shaft maintain silver contacts in automatically-preset position ready for reversing operation. For further information, contact Dept. MPM, Franklin Electric Co., Inc., Bluffton, Ind.

"Packaged" Electrostatic Paint Spray Systems Now Available

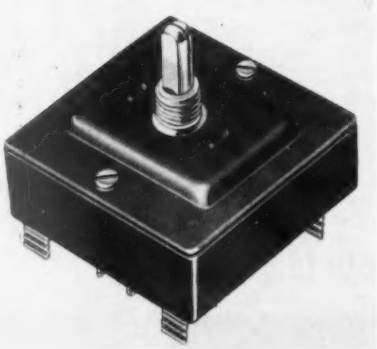
There has been developed six standard electrostatic paint spray systems that are said to handle 85 per cent of the electrostatic painting projects. No special engineering is required where one of these standard systems can be used. Special engineering is required only where special painting problems are encountered, and a special engineering fee is then added to the cost of the equipment. This standardization tends to hold down the cost of electrostatic systems to the majority of users, it is claimed.

For further information, contact Dept. MPM, H. G. Fischer & Co., 9451 W. Belmont Ave., Franklin Park, Ill.



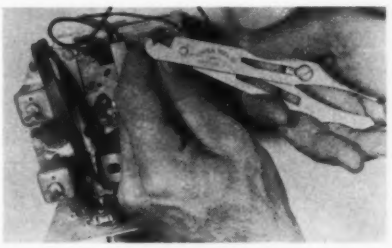
Rotary Snap-type Heat Selector Switch

Series 3000 Rotary Snap-Type 3-5-7 Heat Selector Switch now manufactured by "TEP". Available with different shafts and handles to suit your needs. Contact Tuttle Electric Products.



Positive Lock Wire Stripping Tool Available

A wire stripping tool, called "Strip-it," features a positive lock that can be adjusted to strip any size #10 through #20 single or stranded wire instantly, according to the manufacturer. For further information, contact Dept. MPM, Hunter Tool Co., Box 564, Whittier, Calif.



Heating Unit has Resistance Wire Integral with Casting

Heating units can now be made so that the resistance wire heat source is integral with a casting. The newly-patented process for manufacturing electric heaters and heating elements is called "Adaptatherm" by its inventors, H. W. Tuttle & Co., Adrian, Mich.

A glass fiber-insulated resistance wire of 80-per cent nickel and 20-per cent chrome, which can be bent to any shape desired, is placed in a foundry-type mold. Molten aluminum is poured into the mold, completely surrounding the wire with the exception of the terminal ends. The bond between the wire and the aluminum is said to be extremely good.

The casting can be made in a wide variety of shapes such as the die for extruding liquid plastic, the element for an electric dryer, the surface element for an electric range, a heater for a radar installation, or it may even be the leading edge of an airplane wing where it acts as a de-icer. For further information, contact Dept. MPM, H. W. Tuttle & Co., Adrian, Mich.

More New Products on Page 77

Low Cost Functional Beauty

Low cost and functional beauty go hand in hand at Peerless. The manufacturing of formed wire products requires such a comprehensive knowledge that lower costs are often achieved by very minor design improvements. Peerless works closely with design engineers in the development of formed wire components . . . for lower cost, better functional design and greater durability.

We'd like to talk with you about your formed wire problems. Our know-how can save you time and money . . . yet assure you products of the highest quality.

Your prints will bring a quotation by return mail . . . with suggested modification to reduce the cost.

Write today for further information on Peerless' service and facilities.

Peerless FORMED WIRE PRODUCTS

PEERLESS WIRE GOODS COMPANY, INC.
2702 FERRY STREET • LAFAYETTE, INDIANA
"Peerless Products Please"
ESTABLISHED 1910

FICTION and FACT

FICTION: Paint Overspray Control Requires Complicated and Expensive Maintenance Procedure.

FACT: An RP Paint Arrestor Equipped Booth Can Be Changed In Minutes By Inexperienced Personnel.

RP PAINT ARRESTORS

Photo Courtesy Burnaby Blinds Ltd., Winnipeg, Canada

Inexpensive R P Paint Arrestors are easily replaced in a short time to provide like-new paint overspray removal efficiency, with minimum down-time, at a fraction of usual maintenance costs. Economical original installation, too—and adaptable to almost every type operation, R P Paint Arrestors can cut costs, increase production in your booths, too. Write for information.

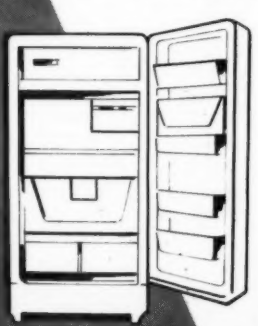
Products of Research RP

RESEARCH PRODUCTS *Corporation*
Dept. 39, Madison 10, Wis.

YOUR BEST BET IN TRIM HARDWARE IS GRIGOLEIT

Whether your trim hardware needs are for custom-made or stock tooled products, call on Grigoleit.

Our complete facilities including designing, engineering and production know-how are at your service.



GRIGOLEIT IS FAMOUS FOR
- Competitive Value
- Dependable Service
- Excellent Quality

THE GRIGOLEIT COMPANY

Home furnishings

→ *from Page 35*

FRED MAYTAG, II — MAYTAG COMPANY, NEWTON, IOWA:

"We are very proud of our line of laundry equipment this year, and feel that the improvement in filtering incorporated into the agitator, will be an appealing feature to the home laundry appliance customer."

JUDSON SAYRE, PRESIDENT NORGE DIVISION, BORG-WARNER CORPORATION:

"Norge anticipates a healthy sales increase in appliance sales for 1958 over the previous year. New features, as well as an energetic Norge sales effort, will account for the increase."

MARY HUCK — HOME SERVICE DIRECTOR, FRIGIDAIRE, DAYTON, OHIO:

"Our new range has what we feel is a revolutionary improvement in broiling. The double broiler pan eliminates troublesome splashing while broiling. This will save the homemaker the chore of cleaning the interior frequently."

B. H. "BUCK" MELTON — SALES MANAGER OF APPLIANCES, ADMIRAL CORPORATION:

"We anticipate a great sales increase, especially for refrigerators, which have a number of improvements. Aluminum and stainless steel external trim enhance this refrigerator's appearance, and, functionally, the new aluminum humidcold plate in the refrigerator, with three times as much coil surface, will enable the homemaker to store foods that are uncovered."

R. ARMSTRONG — GENERAL SALES MANAGER OF THE ELECTRIC UTILITIES DIVISION, WHIRLPOOL CORPORATION

"The automatic ice maker, for which Whirlpool has acquired manufacturing rights and facilities from Servel, will be an outstanding sales feature of both our electric and gas refrigerators. We will be the only company able to supply a full line of either gas or electric appliances, and also be able to supply the revolutionary ice maker." *(See August, 1957* MPM, *"The Servel Automatic Ice Maker.")*

Small Tube to Open New Plant

Small Tube Products. Inc. has announced that its new plant located in Altoona, Pennsylvania is expected to begin production by the first of February. The entire operation will have been transferred from Waterbury, Connecticut, and in full operation, by May 1, 1958.

METAL PRODUCTS STATISTICS

a current report on available production, shipment and sales figures for important products in the appliance and fabricated metal products manufacturing field

GAS WATER HEATERS — November shipments 173,300, 6 per cent below '56; January-November, 2,360,800, 9.4 per cent below '56.

GAS RANGES, BUILT-IN — November shipments 17,000, 19.7 per cent over '56; January-November 180,500, 20 per cent over 56.

GAS RANGES, FREE STANDING — November shipments 140,000, 4.6 per cent below '56; January-November 1,655,100, 12.3 per cent below '56.

GAS FURNACES — November shipments 60,100, 4.6 per cent below '56; January-November 672,100, 12.2 per cent below '56.

GAS FIRED BOILERS — November shipments 8,000, 1.2 per cent below '56; January-November 94,300, 2.5 per cent over '56.

GAS CONVERSION BURNERS — November shipments 13,700, 18.1 per cent over '56; January-November, 156,900, 13.4 per cent below '56.

ELECTRIC REFRIGERATORS — November shipments 211,600, 8.6 per cent below '56; January-November 3,104,400, 10.4 per cent below '56.

ELECTRIC FREEZERS — November shipments 49,900, 8.3 per cent below '56; January-November 853,900, 7.0 per cent below '56.

ELECTRIC RANGES, BUILT-IN — November shipments 35,300, 4.3 per cent over '56; January-November 388,200, 9.5 per cent over '56.

ELECTRIC RANGES, FREE STANDING — November shipments 75,500, 11.6 per cent below '56; January-November, 850,800, 32 per cent below '56.

ELECTRIC WATER HEATERS — November shipments 54,400, 10.8 per cent below '56; January-November 714,400, 14.0 per cent below '56.

ELECTRIC DISHWASHERS — November shipments 30,900, 14.5 per cent below '56; January-November 367,000, 18.5 per cent below '56.

ELECTRIC FOOD WASTE DISPOSERS — November shipments 44,400, 18.8 per cent over '56; January-November 488,000, 10.6 per cent below '56.

COMBINATION WASHER-DRYER — November factory sales 13,169, 6 per cent over '56; January-November 164,657, 81 per cent over '56.

WASHERS, AUTOMATIC & SEMI-AUTOMATIC — November factory sales 196,574, 27 per cent below '56; January-November 2,564,065, 15 per cent below '56.

WASHERS, WRINGER & ALL OTHER — November factory sales 63,886, 17 per cent below '56; January-November, 818,724, 22 per cent below '56.

*ELECTRIC DRYERS** — November factory sales 94,304, January-November, 784,065.

*GAS DRYERS** — November factory sales 47,359, January-November, 358,461.

IRONERS — November factory sales, 4,795, 20 per cent below '56; January-November 39,626, 20 per cent below '56.

VACUUM CLEANERS — November factory sales 251,123, 16.4 per cent below '56; January- November 2,952,671, 14.2 per cent below '56.

METAL FURNITURE — November shipments 5 per cent below '56; January-November, 4 per cent below '56.

TELEVISION — October shipments 624,044, 24.9 per cent below '56; January-October 4,873,819, 10.3 per cent below '56.

*RADIO*** — October shipments 985,969, 23.5 per cent over '56; January-October, 6,830,249, 12.3 per cent over '56.

COMPRESSOR BODIES (Including Automobile Units) — Shipments for September 187,000, 14 per cent below '56; January-September, 3,334,171, 11 per cent below '56.

STEEL SHIPPING BARRELS & DRUMS — October shipments 3,046,650, 0.3 per cent below '56; January-October 29,893,007,7.8 per cent below '56.

STEEL PAILS — October shipments 6,313,040, 11.4 per cent below '56; January-October 64,291,768, 8.5 per cent below '56.

TYPEWRITERS — November factory shipments 116,257; January-November, 1,518,413.

Sources for this information: Gas Appliance Manufacturers Association, National Electrical Manufacturers Association, American Home Laundry Manufacturers Association, Vacuum Cleaner Manufacturers Association, National Association of Furniture Manufacturers, Electronic Industries Association, and Air-Conditioning and Refrigeration Institute, U.S. Dept. of Commerce.

*Note: The above 1956 data have been adjusted to reflect combination washer-dryer sales separately. Combination sales are not counted as either an automatic washer or an automatic dryer. For 1956, breakdown of gas and electric dryer data from which gas and electric combination data have been subtracted, cannot be released without disclosing individual company information.

**Does not include automobile radios.

◆ *NEW GENERAL ELECTRIC pocket-size program control for automatic washers and dishwashers undergoes drop test, which fails to damage the unit's case, contacts, cam, or affect its operation. The unit uses only three reduction gears, and incorporates a one-piece cam that can control up to 11 circuits. Assembly wiring has been made simple by locating all terminals on one side of the program control.*

◆ *THIS ARRAY of aluminum cans indicates the wide variety of sizes and shapes made commercially possible through new manufacturing methods developed by Kaiser Aluminum & Chemical Corp. In addition to many applications in food packaging, they may be used as containers for numerous consumer and industrial products. The tallest can in lower left is a two-piece container now being used for packaging stainless steel welding electrodes. The slender can at far right on the top shelf is similar to one size of the grated cheese containers being produced.*

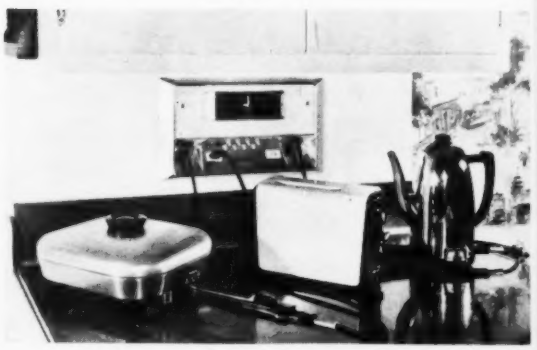
◆ *MODEL 850 electric starter, developed by Fairbanks, Morse & Co., Magneto Div., Beloit, Wis., for use on gasoline engines up to, and including, 4 hp with a maximum displacement of approximately 11 cu. in. The battery-operated starters are available for clockwise rotation only.*

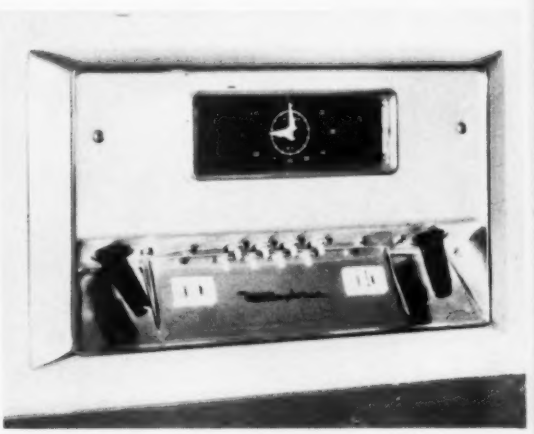
.... foto-news

◆ *STAINLESS STEEL-bodied car, built in 1936, which was recently renovated by the Allegheny Ludlum Steel Corp. Six of these cars were built and sold.*

◆ *THE TIMER-CLOCK on the new Westinghouse Automatic Appliance Center makes it possible for the housewife to cook by "remote control" in her small electric appliances. One of the appliance center's four circuits is connected to the timing device. This timer will start a meal cooking at a time pre-selected by the housewife, and also will turn off the appliances at a pre-selected time.*

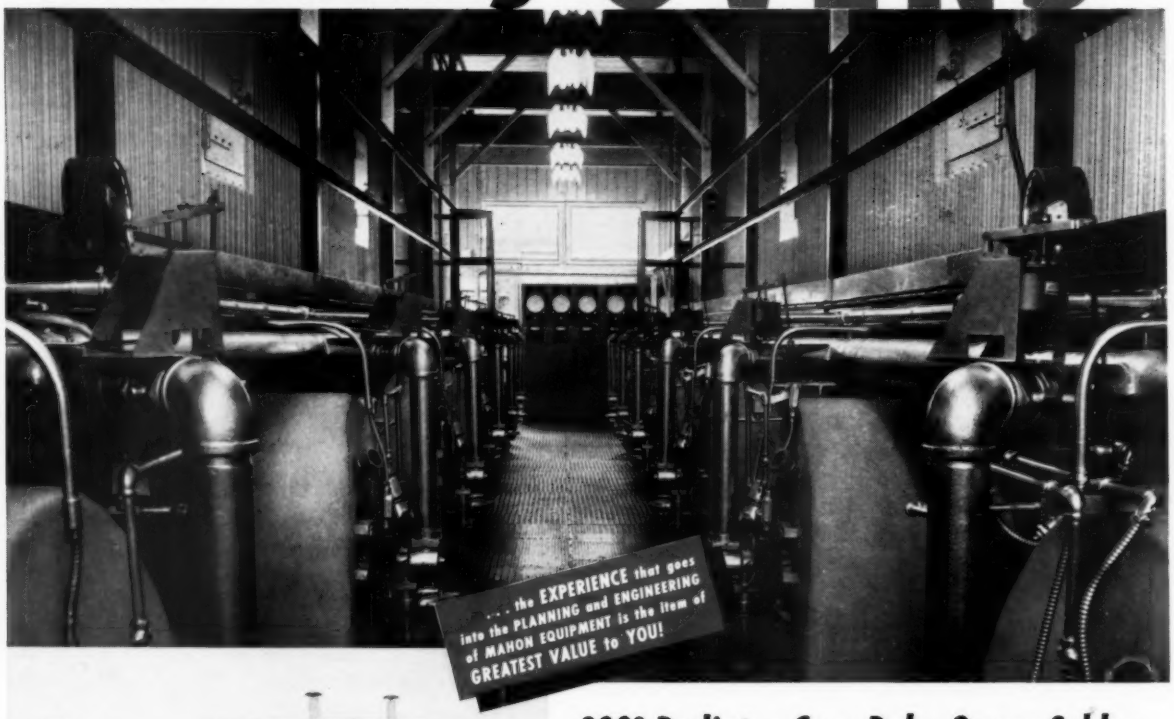
◆ *JUMBO-SIZE, automatically-operated slide rule is offered as proof that automation begins at home. Designed by engineers at Minneapolis-Honeywell, it performs its mathematical steps with push-button ease. An electric motor triggers a small "brain" which maneuvers the three-foot-long slide rule into calculating position. The unique device was a gift to factory manager Jim Locke, shown operating his present.*

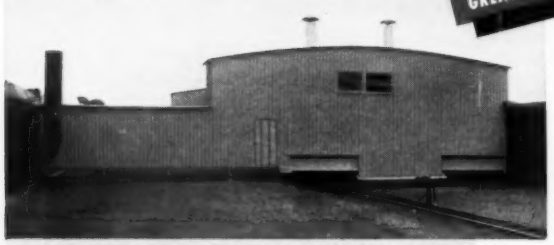




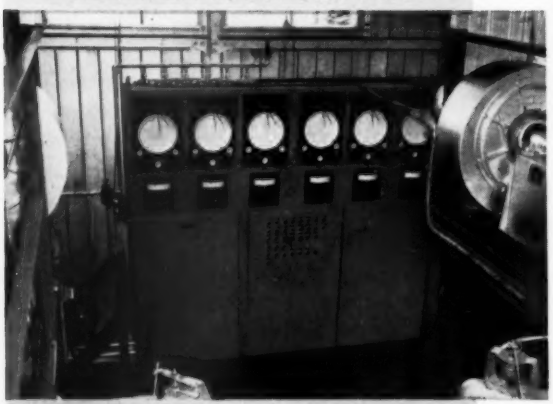
◆ *APPLIANCE CENTER has four circuits, two on pull-out cords and two plug-in receptacles. Each circuit has its own push-button reset circuit-breakers, eliminating the possibility of blown fuses. They may be placed in the kitchen or dining room.*

Processing OVENS





Exterior View of Oven Housing on Roof of Plant. Walls and Roof are Incombustible, Double Rib, Interlocking Rolled Steel Plates.



Control Panel which Contains Starters, Temperature Indicators, Temperature Recorders, Safety Devices and Emergency Cut-Offs.

800° Radiator Core Bake Ovens Solder Radiator Tubes and Center Cores!

The Core Bake Ovens, illustrated here, were recently installed and housed by Mahon on the roof of an automobile radiator manufacturer's plant. The two parallel ovens, which normally operate at 800°, were designed for emergency temperatures up to 1000°. Each oven has six heating zones . . . controls, temperature recorders, safety devices and automatic emergency cut-offs are contained in one compact control panel. The exterior housing which encloses the two ovens, and conveyor lines to and from the ovens, is an integral part of the oven construction on two sides. This installation is typical of thousands of Mahon solutions of production problems demanding specially engineered processing equipment. When you are in need of a special processing oven, or special production equipment of any kind, you will want to discuss your requirements with Mahon engineers . . . you'll find them better qualified to advise you on both methods and equipment requirements. And, because Mahon can point to over thirty-five years of successful operation in this highly specialized field, and has the ability and facilities to handle any type of project large or small, you can be assured that their advise and recommendations will be sound and unbiased. See Sweet's Plant Engineering File for information, or write for Catalogue A-658.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers, Fabricators and Erectors of Special Processing Ovens of All Types; Metal Cleaning and Rust Proofing Machines; Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Cooling Tunnels, Spray Booths, Flow Coaters, Dip Coaters, Finish Baking Ovens, and Complete Comveyorized Finishing Systems; Core Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and Many Other Units of Special Plant and Production Equipment.

MAHON

NEW INDUSTRIAL LITERATURE

Truck Loaded Production Ovens

A line of standard ovens, designed to provide the maximum in temperature uniformity to insure quality production of a variety of products, is being offered.

These ovens are designed for truck or rack loading, and are available in either gas or electrically heated models. They are designed for special work such as baking on phenolic finishes on coils and stators; for finish baking of japans, lacquers or enamels; for drying latex; for pre-heating of plastics, and numerous other applications where fast, uniform heating is required.

For a two color bulletin contact Dept. MPM, Despatch Oven Company, 619 S.E. 8th St., Minneapolis, Minn.

Mixers, Rotary Dryers and Ball Mills Catalog

A new catalog is available which completely describes a wide variety of mixing equipment available, as well as rotary dryers, blenders, and ball and pebble batch mills. The book includes sizes available, typical applications for each unit, and the outstanding features on each and every type of equipment.

Portable mixers are completely described, as well as enameled storage tanks and agitated mixing tanks for paints and porcelain enamel slips.

For twenty page catalog contact Dept. MPM, the Patterson Foundry and Machine Company, East Liverpool, Ohio.

Architectural Porcelain Bulletin

Architectural porcelain enamel on steel or aluminum is the subject of a new eight-page bulletin. Representative data included are: sections on seven panel types, big panel construction and curtain wall remodeling; typical construction details; and specifications for curtain wall and veneer porcelain enamel. This bulletin is available from Dept. MPM, Ingram-Richardson Manufacturing Co., Beaver Falls, Pa.

Precision Finishes on Metals

A new twenty-page brochure entitled, "Precision Finishes on Metals", places particular emphasis on a certain method of hard anodizing. This method is called the "Hardas Process" which has proven to be one of the best methods of hard anodizing. For copies of this brochure, contact Dept. MPM, Anachrome Corporation, 10647 Garfield Street, Southgate, California.

Mounting Specifications for Abrasive Discs

The American Standards Association recently approved and issued a standard on "Machine Mounting Specifications for Abrasive Discs and Plate Mounted Wheels." The material covered in this publication includes location and size of bolt holes in steel disc wheels in the mounting side of abrasive discs in plate mounted wheels. Definitions and standard sizes are listed for abrasive discs in the inserted nut, inserted washer, tapped mounting plate types, projecting stud type and cylindrical type. Copies of the standard are available by writing to the Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.

Infra-red Drying with Ceramic Generators

One method for drying and baking with the use of radiant infra-red heat sources is with ceramic generators, as described in a new booklet. Industrial ovens with interlocking infra-red sections are described. These ceramic generator units are said to be quite durable and have many other operating advantages. For a free copy of this brochure, write Dept. MPM, Dry Clime Lamp Corporation, Greensburg, Indiana.

Preplated Metals Brochure

Preplated metals are available that eliminate cleaning, solutions, plating tanks or polishing wheels, as proven on the production line of a large manufacturer of fabricated metal products. These intermediate steps are eliminated by using preplated chrome — steel and copper-steel. These metals are available in preplated finishes of chrome, nickel, copper or brass on steel, zinc, copper, brass, and aluminum. For free literature, write Dept. MPM, American Nickeloid Company, Peru 11, Illinois.

Metal Moulding Information

Specialists in metal moulding are now able to perform any roll type of moulding, from a coin flat material up to 1/16" in thickness, or roll coined material that is made into sections and roll patterns on metal. A wide variety of production mouldings are available to choose from, and are said to meet the requirements for many custom designs. For more information, write Dept. MPM, Redall Industries, Lexington 1, Mich.

Soak Cleaner Bulletin

How cleaning costs can be reduced by eliminating solvent dips is the subject of literature available from a specialist in soak cleaners. For literature write Metal Industries Dept., The Diversey Corporation, 1820 W. Roscoe Street, Chicago 13, Illinois.

Integrated Finishing Systems

Finishing oven efficiency is the subject of a brochure which answers the six questions said to be necessary to setting up an efficient operation. This book is available from Dept. MPM, Michigan Oven Company, 411 Brainard, Detroit 1, Michigan.

Embossed Aluminum Brochure

Several distinctive embossed patterns providing new eye appeal, added rigidity, and a finish designed to resist damage during fabrication, are available from a specialist in this field. Embossed finishes for television sets, appliance parts and trim, furniture parts, housewares and other items, are described in a booklet entitled "Embossed Finishes". Write for pamphlet — Dept. P-3 Fairmont Aluminum Company, Fairmont, West Virginia.

How Hot Spray Cuts Painting Costs

A new brochure is available which explains the above headline in detail. The new booklet, "New Efficiency From Hot Spray", describes how, with a paint heater, one can get better coverage with one coat than sometimes is possible with two or more cold sprayed coats.

Heat acts as a thinner to permit easier atomization and brings about new efficiency in spray painting, according to the manufacturer. Even with regular paint, heavier finishes can be applied with savings of up to 50%, the manufacturer further states. For the booklet, write Dept. MPM, The DeVilbiss Company, Toledo 1, Ohio.

Zinc Coated Steel Booklet

A continuous process zinc coating on steel is available, which is said to thrive

on the toughest fabrication steps—spinning, deep-drawing, roll forming, and extrusion. Prolonged die life is said to be an advantage because of the lubricative quality of the steel's zinc coating. Send for the new booklet from Weirton Steel Company, Dept. R-6, Weirton, West Virginia.

Electrostatic Spray Painting

It can be proven that many cost saving benefits can be had if present production facilities justify conveyorized painting, according to a manufacturer of the electro-coating process. Up to 50% less paint is said to be used by this system. A brochure is available which pictures many on-the-line examples of electro-coating on a wide variety of products, and describes a free survey service. Write Dept. MPM, Ransburg Electro-Coating Corporation, Indianapolis 7, Indiana.

Stainless Steel Brochure

Stainless steel can be used for tubs in automatic washers, and, according to the manufacturer, has proven to be quite successful. Stainless steel has a smooth, hard surface that is said to protect the finest and sheerest of fabrics. A point is made that there is no surface to wear away and never any danger of flaking, chipping, peeling or cracking — also that stainless can be used for trim and bright work, as well as functional parts. For more information, write Dept. C-4788, Republic Steel Corporation, 3216 E. 45th Street, Cleveland 27, Ohio.

Spray Gun Clean-Out Costs Reduced

Plants using multi-color paint circulating systems frequently shift spray guns from one color line to another. To clean the old color out of the spray gun, the new color must be run through the gun until there is no danger of intermix. A brochure is available which describes how a new spray gun cuts bleed costs almost 65%. All the facts are contained in bulletin RFG which may be obtained from Dept. MPM, The Binks Manufacturing Company, 3122 Carroll Avenue, Chicago 12, Illinois.

Snap Action Switches

Technical literature is available describing switches for a broad range of snap action applications. The switches are said to be of very long life and feature positive make and break action, high contact pressure, resistance to vibration and shock and stability under momentary high overload. Write for Bulletin SL-3, Dept MPM, Controls Company of America, 9559 Soreng Avenue, Schiller Park, Illinois.

High Density Grinding Balls Literature

It is said that up to 45% has been saved on milling time with the use of high density grinding balls. One of the features of the manufacture of these high density grinding balls and lining brick are that they are formed isostatically and fired at 2670°F. to a specific gravity of 3.4. For more information write Dept. MPM. L. Z. P. Industrial Ceramics Company, 275 Kalamath Street, Denver 23, Colorado for Coors Porcelain Company.

Bulletin Describes Foot Shear Line

Bulletin 80-FC illustrates and describes the latest design and operating features of the Series F and Series G (with gap) foot squaring shears for light sheet metalworking..

Described and illustrated are: Construction of crosshead, housings, and bed for utmost rigidity and minimum deflection; modern operating features including positive acting holddown, and well-balanced treadle action; clear cutting line visibility for operating ease and greater accuracy.

Cutting lengths and capacities of all models are given in a full page of specifications. Copies of Bulletin 80-FC can be obtained by writing to Dept. MPM, Niagara Machine and Tool Works, 683 Northland Ave., Buffalo 11, New York.

New Manual Describes 57 Metal-Working Processes

A 16-page manual, describing 57 chemical processes that take place daily in over twelve thousand metal-working plants has been issued by a manufacturer of specialized industrial chemical processing compounds. Printed in three colors, the illustrated manual also includes nine reference charts applicable to the industry.

Among the chemical processes discussed in the manual are: Cleaning, phosphating, conversion coating, protective coating, paint and carbon removing, rust removing and preventing, descaling, electroplating, inspecting, processing aluminum and maintaining of paint departments and other plant facilities.

Reference charts included in the manual are: Conversion factors, decimal equivalents, measuring surface areas, tank capacities, Fahrenheit-Centigrade conversion chart, phosphating reference chart, table of drop in air pressure, energy required to heat water and properties of saturated steam.

Free copies of the manual may be obtained by writing to Dept. MPM, Turco Products, Inc., 6135 South Central Avenue, Los Angeles 1, Calif.

Bulletin Describes Air Motor Units for Screwdrivers

A new bulletin 580-1 tabulates and illustrates more than 30 basic air motor units and torque limiting components for multi-spindle screwdrivers and nutrunners. Fully dimensioned outline drawings are said to enable the tool engineer to develop preliminary plans for job-fitted production equipment. The section describing screwdriver-nutrunner drives may prove helpful in understanding the principal of operation and the proper application of Magnamatic, direct drive, stall torque impact types of torque-limiting clutches. Write Dept. MPM, Chicago Pneumatic Tool Company, 6 East 44th St., New York 17, N.Y.

Stainless Steel Catalog

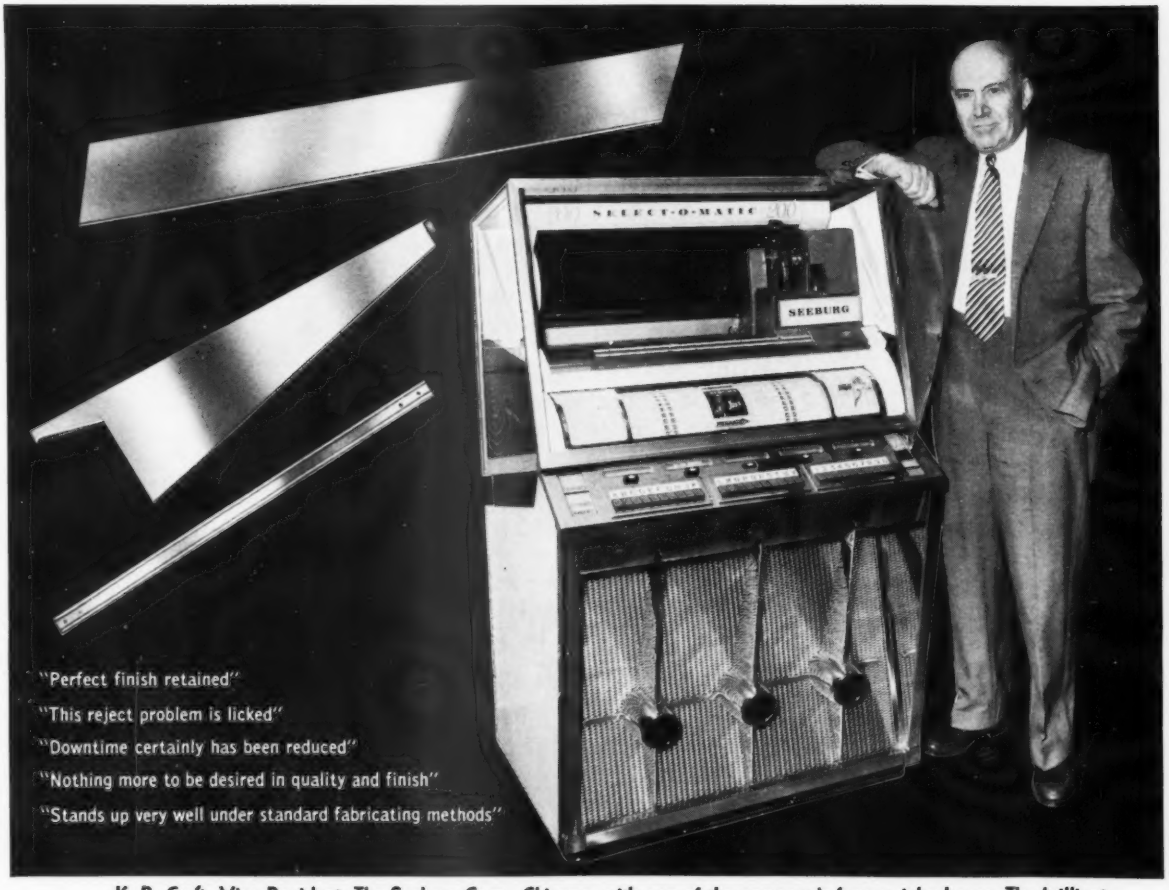
Now available is a technical digest of the most popular stainless steels. The illustrated 32-page catalog offers the description, chemical composition, strength factors, physical properties and typical applications for a broad range of stainless types including the 200, 300 and 400 series of stainless steels. The catalog also includes forging ingots and rolled in surface patterned stainless steels. Catalog available by writing Advertising Department, Sharon Steel Corporation, Sharon, Pa.

Magnetic Conveyor Bulletin Offered

A new illustrated bulletin is offered free by the manufacturer of Magne-Carrier, the magnetic way of carrying parts along on overhead conveyors.

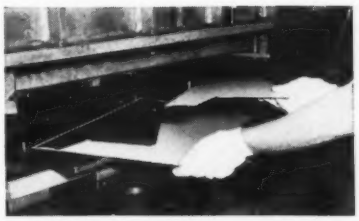
According to the producer, the new system completely eliminates clamps, hooks and other positioning and attaching methods and employs magnetic principles for conveying parts through processing operations.

Full information is contained in the new bulletin on sizes and applications of the Magne-Carrier. Available on request from Dept. MPM, Multifinish Manufacturing Company, 26341 W. Eight Mile Road, Detroit 19, Mich.

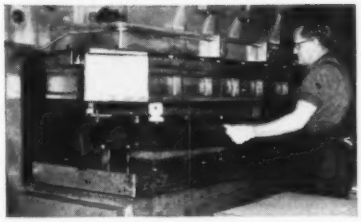

"Perfect finish retained"
"This reject problem is licked"
"Downtime certainly has been reduced"
"Nothing more to be desired in quality and finish"
"Stands up very well under standard fabricating methods"
SEEBURG

K. R. Craft, Vice President, The Seeburg Corp., Chicago, with one of the company's famous juke boxes. The brilliant reflectivity and durability of Nickeloid pre-plated metals is an important factor in the product's eye-catching good looks.

NICKELOID METALS SAVE 4 PRODUCTION STEPS— REDUCE REJECTS FOR THE SEEBURG CORPORATION



Standard fabricating methods are used to stamp and form juke box trim. Nickeloid Metals eliminate machinery tie-up; rejects are less than 1%.



Stamping Nickeloid chrome steel, protected with Mar-Not adhesive-backed paper which is easily peeled off. Finished part will need no polishing.

Pre-Finished Design Material is Easily Worked With Standard Fabricating Methods

The Seeburg Corporation uses Nickeloid *pre-plated* chrome steel to achieve functional beauty and attention-value . . . economically. Before switching to Nickeloid, the company did its own cleaning, plating and buffing. The job required four — sometimes five more operations than are now necessary. According to Mr. Craft, "The tremendous cost of plating and buffing was not only more expensive and much more time consuming, but the finished product had to be inspected, and the rejections on plated and buffed metals was very much higher than it is with Nickeloid. Economically, the Nickeloid Metals have proved themselves in production."

Using standard fabricating methods, Nickeloid Metals need only be stamped and formed — then assembled. By capitalizing on this pre finished *method* of production, this leading manufacturer has eliminated the machinery formerly required for plating, polishing and buffing — saved four or five production steps, and is producing a better end product *with less manpower*. Can you use these advantages in *your* operation?

14 finish-to-base metal combinations — sheets, coils, strips.

WRITE TODAY FOR FREE LITERATURE

NICKELOID METALS SINCE 1898

AMERICAN NICKELOID COMPANY
PERU 11, ILLINOIS

Westinghouse Product Sales Reach Peak

"Sales billed of Westinghouse products will reach the highest peak in the company's history in 1957, approximately $2,000,000,000, and are expected to be even higher in 1958," according to Gwilym A. Price, board chairman.

"The increased billings this year will result from the over-all steady growth of the electrical industry, from an expected modest increase in sales of consumer products and from the increasing emphasis on electrical and electronic components in defense equipment, particularly missiles.

"Although most economists have predicted a slight decline in industrial production, particularly in the first half of 1958, nevertheless, it appears that total output of goods and services will show a slight increase over this year's record," Price continued.

Mulligan Promoted to Special Projects Manager

The promotion of Eugene D. Mulligan to the position of special projects manager of the Porcelain Enamel Institute was announced recently by Managing Director John C. Oliver.

In his new position, Mulligan, who has served as administrative assistant to Oliver since 1955, will assume greater responsibility in connection with the program planning and administration of the activities for PEI's product divisions. He will also coordinate subcommittee programs for major committees.

Oliver stated that Mulligan's new assignment will enable PEI's headquarters office to provide the membership with increased service in connection with the more than 100 separate projects carried on annually within the framework of the Institute.

Sees Metal Building Sales 20 Per Cent Higher in '58

The 1958 sales outlook for the pre-engineered metal building industry is "exceptionally bright," with a 20-per cent increase in dollar volume over 1957 anticipated for the year, as predicted by Peter S. Pedersen, Jr., president of the Wonder Building Corporation of America, Chicago manufacturer of pre-engineered trussless steel industrial, commercial and farm buildings.

Pedersen said 1958 industry volume should reach at least $420 million, or 20-per cent higher than an estimated $350 million for 1957, and 25-per cent higher than 1956.

AHLMA Board Broadened; Names Baumgart President

Guenther Baumgart, formerly executive director, has been appointed president and a member of the board of directors of the American Home Laundry Manufacturers' Association. The new president's duties are to be closely akin to those of a corporate president in modern business management. Simultaneously, announcement was made that the board of directors has been broadened to include one representative from each regular member company of the association.

New officers of the Association, elected by the board of directors, are: chairman of the board — Homer L. Travis, vice president, sales, Kelvinator Division of American Motors Corporation; vice-chairman — Jack D. Lee, manager, laundry equipment division, Westinghouse Electric Corporation; and treasurer — Greg M. Sheehan, manager, finance, home laundry department, General Electric Company.

Robert W. Balcom, formerly associate director, was named executive assistant to the president and director of public relations.

The change, a departure from traditional trade association organization, will permit laundry appliance top industry executives to participate more fully in association policy making without burdening them with unnecessary details or excessive meetings, the AHLMA release states. The new board structure removes the need for calling official annual meetings merely to hear reports and conduct other routine business.

American Motors Will Show Profit in 1958

American Motors Corporation will show an indicated net profit of more than $3,000,000 in its first 1958 fiscal quarter, ending December 31, President George Romney said in an interim report to stockholders.

Romney said that after reducing its operating losses in the 1957 fiscal year to about one-third that of the previous year, the company turned the corner in October toward a profitable 1958 and has continued to operate in the black. Against the indicated profit in the first quarter, American Motors lost $2,994,613 in the comparable 1957 period.

Porcelain Enamel Covers New Avco Research Center

A $15,000,000 research and development center equipped with permanent facilities for basic and applied science is being constructed in Wilmington, Mass., near Boston, by Avco's Research and Advanced Development Division.

The porcelain enameled walls of the new center were produced by Avco's AK Division, through its new Architectural Products Section in Connersville, Ind.

The new center will be in operation by mid-1958, according to Dr. Lloyd P. Smith, president of the division.

Four harmonizing buildings will provide over 400,000 square feet of floor space. Total area of the site is 100 acres. The building was designed by Pereira and Luckman of New York City. Theme is based on a modular concept permitting 100 per cent expansion and rearrangement of space as required.

Locke Stove Purchases Moore Gas Heater Division

Locke Stove Company, Kansas City, Missouri, has purchased the Moore Gas Heater Division of Conlon-Moore Corporation, Joliet, Illinois, and will continue the manufacture and sale of Moore's gas heaters in addition to its own Warm Morning heater and incinerator lines.

E. M. Douthat, President, Locke Stove Company, states that under the terms of the purchase agreement, Locke will acquire all tools and dies for Moore's gas heaters and the right to manufacture and sell the line.

With two lines — "Warm Morning" and "Moore's" — Locke becomes one of the nation's largest manufacturers of gas heaters, in addition to being a top producer of coal heaters and gas-fired incinerators, both of which are sold under the "Warm Morning" name.

The Moore Heater Division of Conlon-Moore Corporation has a 100-year history in the heater and range business. In addition to gas heaters, its products have included space heaters for coal and oil; ranges for coal, oil and gas, and a combination coal and gas range.

Easy to Hold $500,000 Contest

To broaden its dealer structure and step up retail sales in the first quarter, Easy Laundry Appliances, division of The Murray Corporation of America, is starting the new year with a 15-week $500,000 "Selling Spectacular."

Sparking the nationwide sales program at the dealer level is the "You're Worth Your Weight in Gold" to Easy national consumer contest. Some 7500 retailers throughout the country are participating in promotion of the contest, which embraces $100,000 in prizes.

First prize winner will be paid off in dollars for the amount of gold which equals her weight. Figured on the basis of 14 karat gold established at $297.74 per avoirdupois pound, this means that a woman weighing 210 pounds would receive over $62,000.00; a 190 pound woman would win over $56,000.00 and so on.

Temco Aircraft in New Corporate Headquarters

After 12 years of growth, Temco Aircraft Corporation last month completed moving its headquarters into a new home at Garland, Texas, suburb of Dallas.

The move marks the first time that Temco has ever actually had a home it could call its own. The company formerly was headquartered in the U.S. Naval Reserve facility on the western edge of Dallas, adjacent to Grand Prairie. The Navy buildings were occupied by North American Aviation during World War II.

Temco's new, 100,000-square foot corporate headquarters are joined to the recently-completed 100,000 square foot Engineering Center through a central lobby of contemporary, stylized Gothic design.

Protective Coatings Meet

Papers of particular interest to paint men and others interested in this field will be presented at the 12th Annual Divisional Conference of the Protective Coatings Subject Division of the Chemical Institute of Canada.

The sessions will be held at the Seaway hotel in Toronto on February 20, and at the Ritz-Carlton hotel in Montreal on February 21.

The same program will be presented in the two cities. One paper is "Evaluating the Functional Role of the Solvent in Protective Coating."

Gas Industry Spending $2 Billion a Year for Expansion

"The gas utility and pipeline industry, advancing to new heights on all fronts during 1957, is confidently building for the future because millions of Americans are depending on gas for present and future needs," said R. W. Otto, president, American Gas Association.

"The industry is expressing its confidence in specific terms with current construction expenditures of $2 billion

Maytag Unveils Exhibit at Chicago's Museum of Science and Industry

"The Tale of a Tub," a dramatic exhibit portraying the story of home laundering, was presented on January 6th to Chicago's Museum of Science and Industry by the Maytag Company of Newton, Iowa.

The permanent exhibit, which covers 1000 square feet of floor space, tells the story of laundering, from techniques used for Roman Togas through the time of the corrugated wash boards to today's automatic machines.

"The Tale of a Tub" was formally opened at a dedication dinner in the Museum featuring U. S. Secretary of Commerce Sinclair Weeks as principal speaker. Some five hundred guests, including city and state officials, educators, utility company executives, appliance industry representatives and trade association officials, heard Mr. Weeks' discussion of the international trade outlook for 1958.

Theme center of "The Tale of a Tub" is a four times normal size washing machine agitator. The agitator is in constant action, dramatized by the swirling of colorful garments in 600 gallons of water.

Almost the entire floor area of the exhibit is on a turntable which carries visitors past the various exhibit displays. A featured display is an authentic reproduction of an 1890 wash house where visitors can view the laundering paraphernalia of Grandma's day. This is contrasted with a modern setting of today's push-button home laundry equipment.

a year, 97 per cent of it earmarked for natural gas facilities. Expenditures will total $8.7 billions for a four-year period through 1960, compared with $5.3 billion spent in the previous four-year period (1953-56) and $4.7 billion in 1949-52.

"Throughout the United States today the gas utility industry is providing service for 31 million customers in homes, business, industry, schools, churches, hospitals — in fact, everywhere where comfort, convenience, economy, and dependability are essential. These customers receive our 'wonder fuel' from approximately 1,300 utility companies supplied by about 100 transmission companies. In addition, some 9 million consumers who live beyond the present reach of utility mains use 'bottled gas,' said Otto.

Porcelain Enamel Name Upheld By Appeals Court

A firm definition of the term Porcelain Enamel was established by a recent opinion rendered by the U. S. Court of Appeals for the Third Circuit in its review of a previous decision by the Federal Trade Commission.

The action of the court affirmed the Commission in its decision against Arrow Metal Products Corp., et al, and culminates more than two years work through the FTC, by the Porcelain Enamel Institute, its legal counsel and legal committee, to prohibit the company from using the word "porcenamel" to describe an organic finish.

The FTC's accepted definition of porcelain enamel, as stated in the record is as follows:

> "A substantially vitreous or glassy material fused to the surface of a metal."

This statement follows closely the technical definition of porcelain enamel recently adopted by ASTM's Committee C-22 on Porcelain Enamel, which is as follows:

> "A substantially vitreous, inorganic or glassy material bonded to metal by fusion above 800°F."

National Electrical Week Activity to Exceed '57, Report

Reports from individual companies and local committees indicate that the February 9-15 observance of National Electrical Week this year will considerably exceed, in level of activity and impact, the observance of a year ago.

Already, the national committee has received activity reports from well over 300 companies in the industry.

MPM Editor on AIEE Appliance Sub Committee

Dana Chase, Editor and Publisher of METAL PRODUCTS MANUFACTURING magazine, has been appointed to membership on the Domestic Applances Sub-Committee of American Institute of Electrical Engineers. D. C. Krammes, The Hoover Company, North Canton, Ohio, is Chairman of the Sub-Committee.

Plans are now being completed for the program for the 1958 AIEE technical appliance conference scheduled for Chicago, May 26-28.

The Domestic and Commercial Applications Committee (General Applications Division) is headed by G. E. Schall, Jr., Underwriters' Laboratories, Inc., Chairman; B. F. Parr, Westinghouse Electric Corporation, Vice-Chairman; and W. R. Crawford, Whirlpool Corporation, Secretary.

First Standard for Heat Pumps Issued by ARI

Recognizing the growing trend in the development and use of heat pumps, the Air-Conditioning and Refrigeration Institute has just issued the first ARI Standard covering "Unitary Heat Pump Equipment." The new Standard, numbered 240-57, was issued to "establish

Soft, Satin Etch... at a $5,500.00 annual saving!
Bob, we've got to lick this aluminum etching problem fast. During a day I add more etchant than we use for a fresh charge, just to maintain concentration.
No worries there, Bob. AE-16® gives a soft satin etch. Just prepare the concentration for the degree of etch desired. With AE-16, you'll have to add only about half as much etchant, and you can operate your tank at 150° to 170° F.... much cooler than you've been using. The special ingredients in AE-16 will prevent sludging and scale formation.
THE FOLLOWING MONTH...
Morning, Bob. Bet you the AE-16 etchant is still working as smoothly as the first week!
Is it! Here, read my report. We dump every two weeks now. We've cut consumption from 25 drums, to 12 drums a month. This year we'll save more than $5,000 on chemical costs alone.

minimum industry standards of performance of unitary heat pumps, and to provide means for establishing reliable ratings," it is set forth under Section I, "Purpose."

It applies to factory-made residential, commercial, and industrial heat pumps or matched assemblies as defined in the Standard and as manufactured or assembled by a manufacturer.

Whirlpool Purchases Part of Servel; to Market Gas Refrigerators

Whirlpool Corporation has purchased from Servel, Inc., for $6,500,000, all facilities, including patents, property and equipment, relating to the Servel gas refrigerator and ice maker, it was announced recently by Elisha Gray II, Whirlpool president.

The decision to add a line of gas refrigerators, to be marketed early in 1958 under the RCA WHIRLPOOL brand, to the present full line of electric major appliances manufactured and marketed by Whirlpool, makes the company "a major force in our industry for gas appliances."

Impossible yesterday...

→ *from Page 25*

Painting at 500 feet per minute

There is always confusion when speed of application is discussed. Automatic spray methods are in use where the part travel is up to two hundred feet per minute. Roller coating is used at much higher speeds. Recently, some new high speed methods have been developed which can paint contoured surfaces at a speed up to five hundred feet per minute, and without waste. The best part of it all is that the finishes applied at these high speeds are nearly perfect compared to those applied by conventional methods.

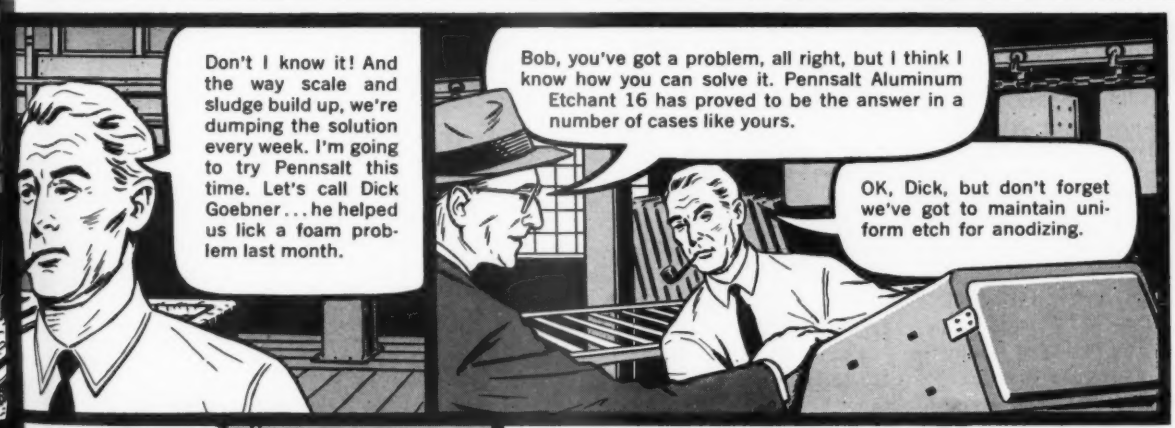
As in all operations, there is an obvious optimum in the application of paint. No one process is capable of application of paint to all products. However, an entirely new method of high speed application will soon make an appearance. It is near the optimum and represents simplicity itself. The only moving parts will be a couple of adjusting nuts and a couple of valves.

It is always easier for an operator to manipulate some controls in an automatic application than it is to apply paint to a product by hand. Yet, one operator can leisurely manipulate the controls on an automatic painting machine which can produce more finished square feet than a dozen hand operators.

The finish sells the product

Well designed automatic paint application results in superior films in both appearance and performance. The user customer deserves the best. It would be well for all of us to remember that the applied finish most often sells the product. Good sales volume means good manufacturing volume and this in turn can mean automatic application with much higher profits.

Many of the finishing equipment suppliers can furnish sound information and interesting case histories. These may sound to some like unusual success stories but rest assured they are mostly fact and justified. It is not a case where paint application methods are stepping out in front of other industrial operations. It is merely a case where they are trying to catch up with other industrial automation.


Don't I know it! And the way scale and sludge build up, we're dumping the solution every week. I'm going to try Pennsalt this time. Let's call Dick Goebner... he helped us lick a foam problem last month.
Bob, you've got a problem, all right, but I think I know how you can solve it. Pennsalt Aluminum Etchant 16 has proved to be the answer in a number of cases like yours.
OK, Dick, but don't forget we've got to maintain uniform etch for anodizing.
That's great, Bob . . .
And that's not all. On top of that, I figure using Pennsalt etchant saves us an easy $100 every month on maintenance and heating costs. Do you realize AE-16 let us lower the temperature of the etch tank 30°?

Dick does realize it. It's part of the knowledge he brings to customers' problems. No matter what your metal (or your metalworking problem), Pennsalt service gives you "A BETTER START FOR YOUR FINISH."

Pennsalt Chemicals Corp.
Dept. 567, 3 Penn Center
Philadelphia 2, Pa.

Pennsalt Chemicals
ESTABLISHED 1850

Send information on Pennsalt ☐ Metal cleaners ☐ phosphate coatings ☐ cold-working lubricants

Name_____

Company_____

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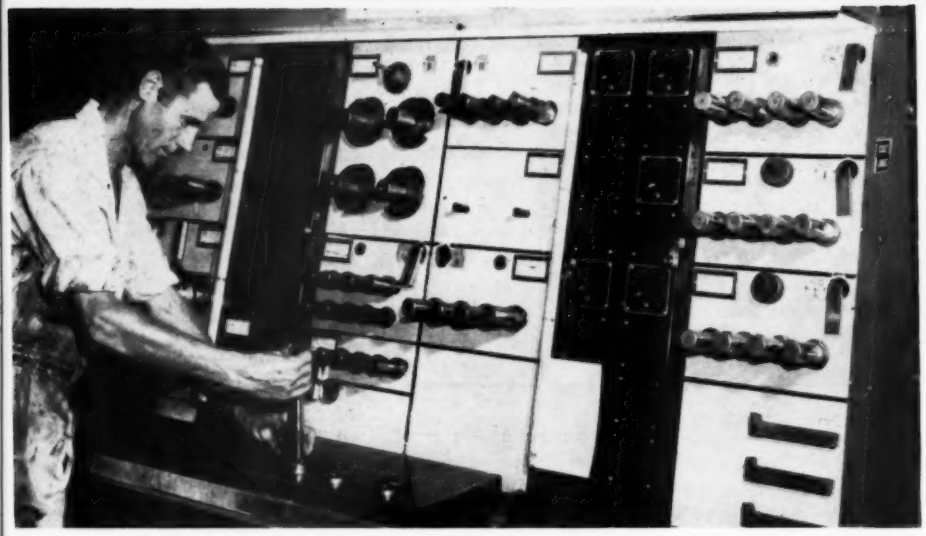


Toolboard presents tools in sets, enabling tool-changers to make tool change at one time, greatly reducing number of unscheduled production shutdowns.

Toolboards keep transfer line moving smoothly

TO keep a transfer machine with 84 cutting tools operating smoothly and efficiently, a system known as "Toolitrol" has been devised. The cutting tools and holders, together with the necessary presetting tools, are stored in spaces provided in the board, and are identified by work station and/or spindle. Cutting tools in holders are preset on the tool plate provided with the board. "Toolitrol" counters are set to provide optimum tool life, and to notify the operator when the time for change-over approaches. When the time comes to make a tool change, a warning light atop the panel goes on and teams of tool-changers proceed to change all tools which are approaching a change signal. This team action permits putting the machine back on the line more quickly and efficiently than would be possible if each toolsetter tried to operate individually.

For further information, contact Dept. MPM, Scully-Jones and Co., Chicago, Ill., or Special Projects Editor, METAL PRODUCTS MANUFACTURING.

Tube mill produces aluminum tubing at 260 fpm

A NEW tube mill is now producing commercial aluminum tubing at 260 feet-per-minute, claimed to be the highest continuous-production speed known in this application. Installation of the 2KU (2½-inch OD capacity) tube mill was made at JFD Electronics Corp., Brooklyn, N. Y. The tubing is being produced for clothes dryers, television antennas, masts, outdoor furniture, etc. It is said quality of the tubing requires no further finish-processing.

The mill is said to be immediately adaptable to produce tubing from different metals, with no adjustments to the mill itself other than to regulate speeds to suit welding requirements of various types of metals.

For further information, contact Dept. MPM, Abbey Etna Machine Co., Perrysburg, Ohio, or Special Projects Editor, METAL PRODUCTS MANUFACTURING.

New tube mill produces commercial aluminum tubing at rate of 260 fpm. Unusual feature of mill is its ready adaptability to produce tubing from other metals.

Industry Developments

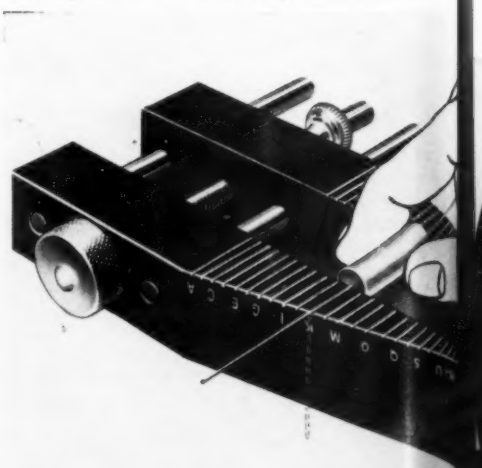
Universal bending block for component leads

A hand tool for bending leads on resistors, diodes, capacitors, etc., during assembly to accurately register with their holes in printed circuit panels has been announced. It is claimed by the manufacturer that this tool eliminates plier damage to leads and components and that, by its use, the appearance of the assembled circuit is greatly enhanced. Wire distortion and twisted or out-of-line components are avoided because all components are accurately centered, it is said.

The tool may be quickly adjusted to any component body length from ¼" to 1¾". Leads can be bent to within .070 of end of component, and up to 3" hole centers.

For further information, contact Dept. MPM, By-Buk Co., 4314 W. Pico Blvd., Los Angeles 19, Calif., or Special Projects Editor, METAL PRODUCTS MANUFACTURING.

Leads are bent to exactly register with their drilled or punched panel holes. Wire distortion, and twisted or out-of-line components, are avoided because all components are accurately centered.



A roller-type copper electrode, one side of which is insulated from the other, is shaped to the contour of the size tube being welded. At the point of contact with the butted edges of the tube, resistance across the seams creates heat, which in combination with pressure rolls, joins the edges of the steel.

High frequency welding adapted to steel tubing

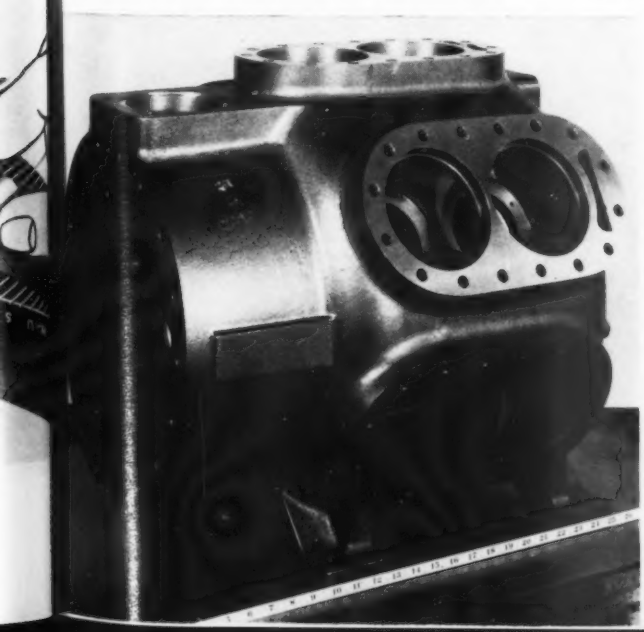
ADAPTATION of ultra high frequency resistance welding for high quality steel tubing has been announced. Climaxing almost two years of research, engineers report adapting the New Rochelle Tool Corporation's "Thermatool" process to produce limited sizes and gages of tubing, from 1" O. D. to 3" O. D., and wall thicknesses of .050" to .100". The ultra high frequency method produces an edge surface weld, and employs the electric resistance principle.

The new method is said to have proved capable of producing tube at high speeds with a high quality weld, providing the power forming and other adjustments are maintained.

For further information, contact Dept. MPM, Steel and Tubes Division, Republic Steel Corp., 224 East 131st St., Cleveland 8, Ohio, or Special Projects Editor, METAL PRODUCTS MANUFACTURING.

Giant compressor housings barrel finished

COMPRESSOR housings weighing 285 lbs, and measuring two and one-half ft. along the base are now being deburred and polished in a "fixture" type Almco barrel. The unit utilizes custom-designed fixtures to hold the large part securely during the work cycle, yet permitting abrasive action to reach all surfaces. Intricate parts, with complex configurations, can be processed in such equipment, according to the manufacturer. For further information, contact Dept. MPM, Almco Div., Queen Stove Works, Inc., Albert Lea, Minn., or Special Projects Editor, METAL PRODUCTS MANUFACTURING.



Heavy compressor housings that measure up to 2½ feet in length can now be effectively barrel finished with Almco machines and methods. The housing shown is used by a leading air conditioning and heating equipment manufacturer.

The solution can be made up with either sodium or potassium salts. Permissible cathode current densities range from 10 up to 60 ASF. The process is applicable to automatic, still, and barrel plating.

Bright cyanide copper process offers low costs

A new bright cyanide copper plating process, using an entirely new combination of additives which reduce plating costs and simplify control, has been introduced. Known as M&T Bright Cyanide Copper, the process is said to promise fast plating speeds, improved brightness, and other advantages on all common base metals. Uniform brightness ranging from mirror-bright to any lesser degree as desired to meet specific requirements may be maintained.

According to platers who have used the new process in production, it yields deposits brighter than any previously obtained without buffing. Because of its appeal, it can also be used as a final finish. Both laboratory and field tests confirm that the process provides superior anode corrosion and better stability, it is claimed.

For further information, contact Dept. MPM, Metal & Thermit Corp., Rahway, N. J., or Special Projects Editor, METAL PRODUCTS MANUFACTURING.

Hook 'em on Inconel for in-furnace safety

Notice these little 3/16 inch diameter "S" hooks?

The plant superintendent of California Metal Enameling Company (Cameo) reports they last four times as long when made of Inconel* nickel-chromium alloy. That's in Cameo's continuous furnace, 1500°—1600°F.

Big thing, though, is not Cameo's saving in burning hook expense. It's their saving in spoiled ware and lost furnace time. With these lightweight Inconel alloy hooks, droppage of ware and pile-ups in the furnace prove rare. The hooks don't shed scale either.

Inconel provides two-fold protection

1. **It retains its strength under sustained high temperatures.**
2. **It resists corrosive attack and scaling by furnace atmospheres.**

For conditions like these, specify Inconel alloy burning tools and fixtures. Your fabricator can form them readily in wanted shapes. Inconel alloy welds well, too.

*Registered Trademark

More information? Write today for "Keeping Costs Down When Temperatures Go Up." This Inco booklet contains many practical suggestions on extending equipment life.

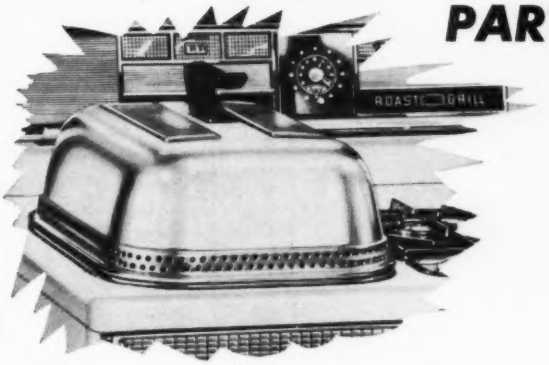
The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

Inconel... *for long life at high temperatures*

FIBER SANDING DISCS

Established quality manufacturer has amazing deal for quantity users and salesmen. Samples available for testing. Write Standard Abrasives, Division of Marvel Industries, Buick Street, Boston 15, Massachusetts.

WE ARE PROUD OF OUR PART...



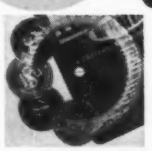
Yes, we are proud of our part in the development of the new Roast-O-Grill by Roper . . . and our complete tool and die—engineering and stamping facilities are ready and anxious to take pride in a job for *you!*

Send blue print or specifications—our production know-how can save you time and money.

Tooling and Dies by West Bend Tool & Mfg. Co., West Bend, Wis. division of . . .

V. W. DANIELSON
MANUFACTURING COMPANY
3364 W. HOPKINS ST., MILWAUKEE 16, WISCONSIN

WHICH { MEYERCORD *NAMEPLATE* DECAL Does Your Product Require?


for abrasion resistance

for weather resistance

for smooth metals

for special surfaces

MEYERCORD Types "C", "G", "J" or "H" Nameplate Decals designed for special problems of heat, abrasion, weathering and new finishes . . .

Heat . . . abrasion . . . weather and many of the new surfaces are deadly enemies of most types of product markings. But not to the new improved Meyercord Markings—types C, G, J and H (heat resistant). Depending upon the surface and the conditions of use, one of these new-type Meyercord Markings will, by actual test, almost certainly solve the problem. For exact recommendations designed to meet your special requirements, drop us a note outlining the problem, along with an actual sample of the surface. This service is offered without obligation of any kind.

FREE—Meyercord Marking Method

We've recently published new data about Meyercord Types C, G, J, and H (heat resistant) nameplate markings. For your free copy, please write on company letterhead.

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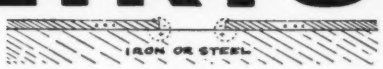
Cut Galvanizing Costs as much as 75% with

ZINC RICH COATING ®

Z.R.C.



If you buy galvanizing—or if you have a product that can be improved by galvanizing you can get galvanic protection against rust and rust creepage via Z.R.C. for as little as 1½c per sq. ft.

And because Z.R.C. is easily applied by brush or spray you can galvanize iron or steel surfaces of any size anywhere. And this galvanizing can be done by your own people—a self-contained operation!

Z.R.C. is a free-flowing compound consisting of 95% pure zinc—dries quickly to a tough, flexible, firmly adherent coating—can be built up to any thickness. No special mixing or surface preparation is necessary. Protection begins on contact and lasts (Z.R.C. will withstand over 3000 hour salt spray testing). For prices, details and ordering information . . .

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GET THESE BLAISDELL EXCLUSIVES
SPEE-D-POINT perforation for easy sharpening—STED-D-POINT staple for secure lead
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Marks all surfaces. Six colors with matching leads.
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Catalyst bed consumes pvc fumes

EASY installation of "All-metal" catalyst elements can now be made in the recirculation system of a large oven. Elements are designed to destroy polyvinylchloride fumes, permitting reuse of heat, and reducing the fuel demand for exhaust ventilation by approximately 80 per cent. Fumes are oxidized or burned by the catalyst elements without propagation of flame. Organic constituents from a few parts per million up to, and exceeding, usual insurance-approved vapor concentrations, can be safely consumed, case history reports show. Operating temperatures in the 600-degree range are common, with fresh air dilution provided to assure delivery at desired oven control temperature.

Catalyst elements of this type are capable of operating 30,000 to 40,000 hours without requiring factory service. Reactivation for succeeding life spans is accomplished at a fraction of initial cost. Temperature controls provide fully-automatic operation, with substantial savings in fuel cost for most continuous-type solvent evaporation ovens.

Photo shows ease in which catalyst elements are installed in large oven. Fumes are oxidized or burned by the elements, and this type of element is capable of operating 30,000 to 40,000 hours without requiring factory service.

PHOTO COURTESY CATALYTIC COMBUSTION CORP.

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for the best, most economical, quality stampings and fabricated parts . .

Youngstown produces drawn stampings and fabricated parts for leading manufacturers of various products—providing quality parts and a dependable, economical source of supply.

First we analyze the part to be produced, design and build the required special tools, arrange the production line to produce parts efficiently that meet your exact specifications. That is why Youngstown Metal Products has been a preferred source of supply to many manufacturers for the past 25 years.

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METAL PRODUCTS COMPANY

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INDUSTRY PERSONALS

Dwight R. Anneaux, general sales manager, special markets, for Whirlpool Corp. has been appointed to the new position of general manager of the recently-formed utility division, it was announced recently by Jack D. Sparks, director of marketing.

Appointed to the executive staff of the Whirlpool utility division are **Robert M. Marberry,** general sales manager, gas utilities; **C. R. Armstrong,** general sales manager, electric utilities, and **John W. Benson,** advertising and promotion manager of the utility division which embraces both gas and electric utility companies.

Harold S. Walker, Jr., secretary of the American Gas Association since February, 1957 has been named assistant to the managing director. He joined the AGA staff early in 1955 as secretary of the general management section.

Promotion of **Robert J. Criddle** to the newly-created position of general sales manager, contract and builder sales division, for RCA Whirlpool kitchens and home appliances was announced recently by Charles A. Reinbolt, general manager, kitchen division, Whirlpool Corp. Criddle joined Whirlpool in March, 1952 and has served, successively, as sales manager of the defense contracts division; assistant sales manager, builder division; and sales manager, contract sales.

Charles T. Lawson has retired as vice-president of American Motors Corporation and director of its Kelvinator appliance division's sales activities effective January 1.

Paul W. Wyckoff has been named vice president in charge of engineering for the Airtemp Division of the Chrysler Corporation.

Wyckoff began his affiliation with Airtemp in 1946 as director of the division's engineering laboratory. He was named assistant chief engineer in 1950, and in 1954 he was named chief engineer, the post he held at the time of his present appointment.

A. W. Paull, Jr., has been elected president and treasurer of the Wheeling Stamping Co., Wheeling, W. Va., it has been announced.

Howard K. Cooper has been appointed project engineer in charge of audiometry for the Beltone Hearing Aid Co., Chicago.

R. E. Gould has been promoted to chief engineer of Frigidaire, Dayton, Ohio. He succeeds **J. L. Gibson,** who is on extended sick leave.

Landers, Frary & Clark, New Britain, Conn., has announced the following changes: **Fred W. Hornbruch, Jr.,** has been elected vice president in charge of subsidiary companies manufacturing; **William J. Russell** has been made vice president in charge of engineering and manufacturing of the New Britain plants; **Leo A. Milewski** has been promoted to manufacturing manager; **Charles McLaughlin** has been appointed general superintendent of production; and **Richard L. White,** chairman of the board, and **Earle J. Van Buskirk,** vice president, have retired.

Anthony J. De Fino has been elected vice president of Hupp Corp., according to Don H. Gearhart, president.

COMING MPM FEATURES

DESIGN

DESIGN FOR A BATHROOM SCALE

By Palma Knapp Assoc. — Designers

FABRICATION

FABRICATING STEEL SANITARY WARE

an MPM plant feature on a modern installation

FINISHING

WHERE IS COLOR GOING IN THE METAL PRODUCTS FIELD

PORCELAIN ENAMELED ALUMINUM

AN AUTOMATIC DIPPING MACHINE THAT WORKS

Photo details on a Whirlpool installation

PRODUCTION

INFRARED HEATING DOES MANY JOBS

PART II

By John Sincere — Technical Editor

New products

→ *from Page 57*

Synchronous Motor Employs Standard Frame Size

There is in production a synchronous induction motor built in the same NEMA frame size as a standard motor of equal horsepower.

Called the Syncro-Spede, this motor accelerates as an induction motor but runs at exact synchronous speed without permanent magnets or D.C. excitation involving collector rings and brushes, wound rotating fields, etc. It is said to be the most compact AC motor available for synchronous applications, and to offer the highest power factor and efficiency. It is suitable for use on many applications requiring constant speed with varying load. The Syncro-Spede can be used for constant speed drives in such industries as machine tool, synthetic fiber, plastic, paper, wire-drawing, glass making, and printing. Because of its size it can provide precise frequency systems in small generator ratings.

As a conveyor drive, the motor makes it possible to have an exact constant-speed or adjustable-speed system from no-load to full-load conditions with a minimum of driving units and controls. Since this motor is unaffected by voltage fluctuations, it is also ideal for precision timing and metering devices, and for recording instruments.

For complete information, write Dept. MPM, Louis Allis Co., Dept. P, 427 E. Stewart St., Milwaukee 1, Wis.

Snap-action Air Gun

A new air gun recently introduced is presented as "lightweight and rugged". The gun is made of machined steel components. Simplified design has eliminated springs, valves, and rubber seals. (A rubber "O" ring, which has no sealing function, is the only rubber part.) For further information contact Dept. MPM, Zalo Mfg. Co., 4893 Van Epps Road, Cleveland 9, Ohio.

Plastic Film Protects Metals in Forming

Severe drawing and forming operations that were formerly difficult to achieve with pre-finished metals are now being satisfactorily produced with pre-finished Nickeloid Metals protected with Mar-Not, according to the manufacturer. Mar-Not is a protective coating that is said to permit Nickeloid Metals to meet unusually severe fabricating and handling conditions without harming the plate finish. It is available in two forms. For further information, write Dept. MPM, American Nickeloid Co., Peru, Ill.

Chemical Blanket Covers Phosphate Bath's Fumes

A chemical blanket has been developed for use on hot phosphate coating baths. Called Serseal, the chemical acts as a barrier to prevent the escape of steam and fumes. Heat savings up to 70 per cent have been reported in actual field use. Serseal has also shown reductions in the cost and time required for maintenance of heating elements. Since the bath is sealed, there is little escape of fumes and vapors. For further information, write Dept. MPM, American Chemical Paint Co., Ambler, Pa.

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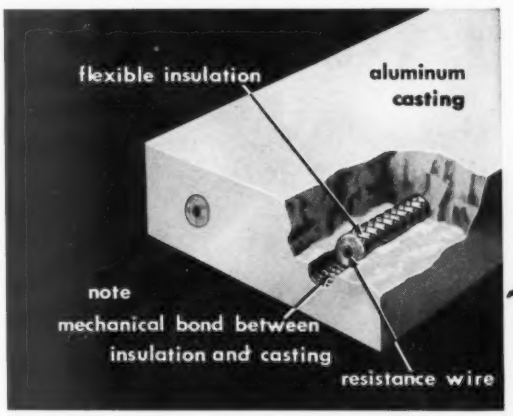
NEW HEAT MAGIC FOR YOU!



"ADAPTATHERM" elements give you the heat *you* want, where *you* want it. *You* specify densities and distribution, Tuttle will furnish "ADAPTATHERM" to your *exact* requirements. Formed to any shape during manufacture, "ADAPTATHERM" resistance wires are then "cast in" aluminum. Result—generated heat is transmitted to the surface like the flick of a whip—immediately and without loss.

Other features include: Longer life ("ADAPTATHERM" elements have operated 13,740 hours with 750,000 off-on cycles without a failure.) • Moisture proof terminals • One piece construction • No barriers to inhibit heat transmission — lower wire temperature, higher surface temperature • Less current leakage • Priced for today's competitive market.

Write today for complete information on "ADAPTATHERM" magic, including test results.

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direct heat transmission

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NEWS about Suppliers

Northwest Chemical Company Marks 25th Year

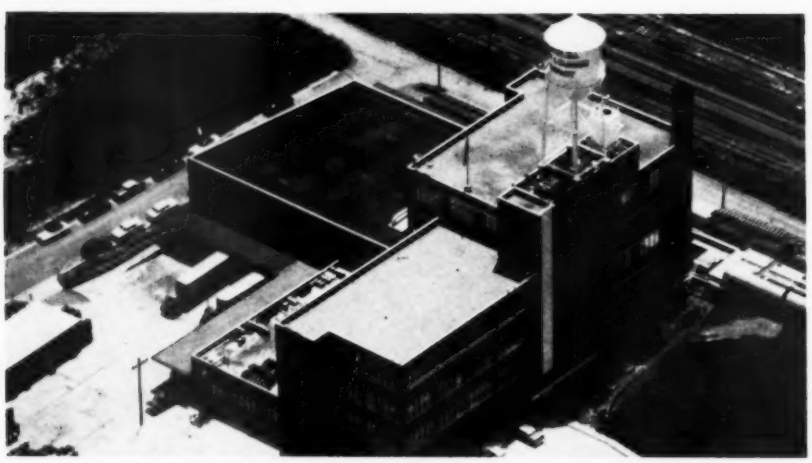
Growth from a one-room plant to one of the country's leading manufacturers of industrial chemicals for metal finishing, with over 23,000 square feet of modern plant area, was celebrated in December by Northwest Chemical Co., 9310 Roselawn, Detroit, Mich.

High point of the festivities was a dinner given for all employees by the management, a surprise presentation, by the employees, of a large oil painting for the firm's new lobby, and engraved watches to the three founders, H. J. McCracken — president and general manager, Helen M. Morell — vice president, and B. F. Lewis — secretary-treasurer and chief technician of the firm's extensive research laboratory.

Carolina Paint & Varnish Adds Facilities

New manufacturing facilities increasing production capabilities 40 per cent have been completed at Carolina Paint & Varnish Co., Greensboro, N. C., according to R. G. Brooks, general manager.

A total of 33,000 square feet has been added to the plant area bringing the total area under roof to 103,000 square feet. A division of United Wallpaper, Inc., Chicago, the Carolina plant manufactures a variety of finishes for industrial and consumer applications in the South.



Fairmont Aluminum Opens Cleveland, Ohio Office

Fairmont Aluminum Company, Fairmont, W. Va., producer of aluminum sheet, coil and circles, has opened a new Cleveland, Ohio district office, it was announced recently by W. Bradley Blair, Fairmont director of sales.

Blair also announced the appointment of John A. Schroeder as district manager in charge of the new Cleveland office, which is located at 1836 Euclid Street.

Fairmont Aluminum Company is a wholly-owned subsidiary of Cerro de Pasco Corporation.

Forty-One O. Hommel Employees Receive Awards

Forty-one veteran employees received service pin awards during a presentation ceremony at the 67-year old ceramic supplier, The O. Hommel Co., Carnegie, Pa.

Presentation of the pins was made by Ernest M. Hommel, president. Sixty-two per cent of the total company employment roster have 5 years or more service. Sixteen veterans are in the 10 year bracket; 4 are in the 15 and 25 year category, and 2 in the "old timer" class of 25 and 30 years service, respectively.

Pennsalt to Sell White-Roth Metal Processing Machines

Pennsalt Chemicals Corporation, Philadelphia, is now exclusive sales representative for the line of metal processing machinery made by the White-Roth Machine Corporation, Lorain, Ohio, it was announced by John M. Davidson, manager of Pennsalt's metal processing department.

The move brings together a chemical firm with a line of lubricants, coatings, phosphatizing compounds, metal cleaners, and strippers, and a machine company that has stressed automation in its metal processing equipment, which includes washers, coaters, and driers. Company officials say that growing demand for completely-engineered automatic systems and nation-wide service was a major factor influencing the new arrangement.

"TEP" Acquires Series 3000 Switch Business From T & K

Manufacturing and sales rights of Series 3000 rotary snap-type selector switches formerly produced by Tuttle & Kift, Inc., Chicago, for electric ranges, room air conditioners, space heaters,

etc. have been recently acquired by Tuttle Electric Products, Inc., of Kirkland, Illinois, according to an announcement released by Mr. D. V. Tuttle, President. Transfer of records to the Tuttle factory and offices in Kirkland, Illinois, has now been completed. *(photo of 3000 series switch in New Products section, page 57)*

Vitro Executive Dies

Funeral services were held January 4th in Grove City, Pa., for Robert G. King, 39, assistant general manager of Vitro Mfg. Co., Pittsburgh, Pa., who died January 1st in Grove City Hospital.

King, a World War II veteran, joined the Vitro sales department in 1946 after discharge from the Army Medical Corps. He was named sales manager in 1950, and became assistant general manager in 1957.

Inland Moves "Across the Street"

Inland Steel Company President Joseph L. Block left his office in the First National Bank of Chicago, quarters the company has occupied since 1904, 5:15 on Friday, January 10 to enter Inland's own building, an ultra-modern stainless steel and glass skyscraper on the northeast corner of Dearborn and Monroe, just across the street.

On Monday, January 13, all the company's top officials and general office staff of 530 resumed work in the new offices. Records and files, moved "across the street" over the weekend, were already in place and ready for use, as well as new furniture which was designed to harmonize with the building's modern character.

Because of the modernistic decor of the new building, the move represents a complete break with the past as Inland people left behind furniture, pictures, and office equipment accumulated over the years. The new quarters include such features as complete air-conditioning, a cafeteria, solar-tinted floor-to-ceiling glass walls, medical facilities, and painting and sculpture by prominent American artists.

The move is the third in the company's history. Its first headquarters was at Chicago Heights, Illinois, where the company was founded with an original staff of 15.

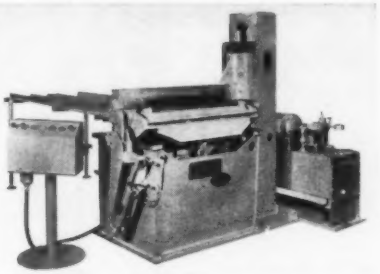
Formal opening and dedication ceremonies will wait for the interior of the building to be more fully completed.

Conveyor Systems, Inc., Moves

Effective January 10, 1958, Conveyor Systems, Inc., long a resident of Chicago's west side, occupied their newly-constructed and modern plant and offices located at 6451 Main St., Morton Grove, Ill.

Since 1923, the firm has been in the field of conveyors and special material handling machinery, specializing in completely - engineered equipment as well as wheel and roller gravity conveyors, portable belt units, overhead trolley conveyors, etc. For a number of years it has been evident that the move to larger quarters was necessary, due to the growth of the company, and plans for the new construction began in 1955.

Award License Agreement for Metal Bending Machine to Taylor-Winfield Corp.



A license agreement has been concluded by Designers for Industry, Inc., of Cleveland with The Taylor-Winfield Corp. of Warren, Ohio, for manufacture and world-wide sale of a line of tangent bending, roller table bending, and tumble die bending machines.

According to J. D. Anderson, president of The Taylor-Winfield Corp., this equipment formerly manufactured by Struthers Wells Corp. will be added to the present equipment produced at the Warren, Ohio plant.

They are said to answer the need for edge-bending flanged sheet metal to eliminate the necessity for notching, forming, welding, or brazing, and grinding and polishing without wrinkles or distortion.

Universal Paint Expands Laboratory

Construction of a new, $38,000 development and testing laboratory has just been announced by S. D. Fields, president of Universal Paint & Varnish Inc., Bedford, Ohio, manufacturers of industrial finishes since 1927. When completed, the addition will more than quadruple the current technical section.

to Page 83 →

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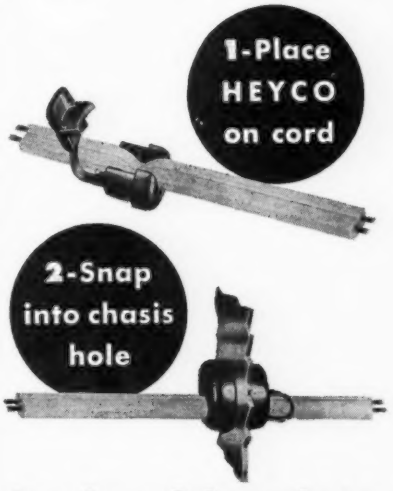

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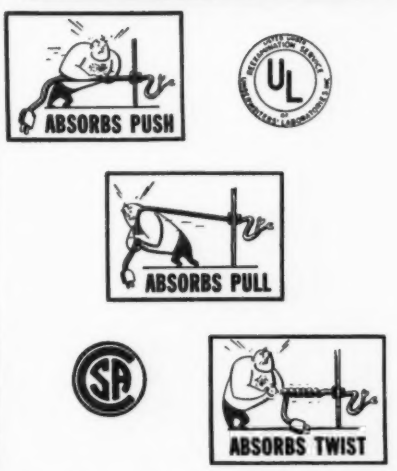

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SUPPLIER PERSONALS

Fairmont Aluminum Company, producer of aluminum sheet, coil and circles, has opened a new Pittsburgh, Pennsylvania district sales office, it was announced recently by W. Bradley Blair, Fairmont director of sales.

Blair also announced the appointment of **Virgil P. Poe** as district sales manager in charge of the Pittsburgh office.

C. A. DuBois and **Louis Lerner** have been elected president and executive vice president, respectively, of the DuBois Co., Inc., Cincinnati, Ohio, it has been announced.

The appointment of **James E. Paumier** to the new position of general superintendent of the E. W. Bliss Company's Canton Div. was announced recently by John A. Lindberg, division manager.

Beginning with Jan. 1, 1958, **Walter T. McCoy, Sr.,** is retiring from the industrial equipment field after a career of nearly 50 years that has had him closely concerned with paint finishing, dust and fume control, and industrial oven systems.

For the past 35 years, McCoy has been with The R. C. Mahon Co., serving for 25 of those years as manager of the Industrial Equipment Div.

Philip Hawkins has been named president of Texas Steel Co., Fort Worth, Texas. Other new officers include: **B. V. Thompson,** vice president and assistant to the president; **Thurman Killman,** vice president; **M. C. Boisselier,** vice president; **E. F. Laminack,** assistant vice president; **Charles T. Ragland,** secretary and director of purchases, and **Robert E. McHam,** treasurer.

Walter G. Stittmann, formerly Oakite's Pittsburgh Division manager, has been transferred to head the new Upper New York State Division. Stittmann is a veteran of twenty-one years service with Oakite. **John P. Melhado,** formerly a field representative in New York City, will replace Stittmann in Pittsburgh.

The advancement of **Michael Gladstone** to the position of general manager of Alloy Precision Castings Co., Cleveland, Ohio, Division of Mercast Corp., has been announced by Frank W. Glaser who is Vice President in Charge of Operations of Mercast Corporation.

Gladstone has been Alloy Precision's sales manager since 1955. Prior to joining the Cleveland firm, which produces precision investment castings by several techniques, he spent 13 years in the investment castings field in the East.

The promotion of **Walter Poremba** to the position of sales manager of Alloy Precision Castings Co., Cleveland, Ohio also has been announced.

Before joining Alloy Precision's sales force two years ago, Poremba spent 11 years in various executive positions in foundries in the greater Cleveland area.

GLADSTONE

POREMBA

The appointment of **Clayton Kiser** as a Frederic B. Stevens sales engineer was announced recently by Frank Watt, Stevens general sales manager.

Kiser comes to Stevens from the Frigidaire Division of General Motors where he has been employed as an electrochemist for several years.

A. W. Beck has been appointed to the newly-created position of vice president of marketing for Robertshaw-Fulton Controls Co. He becomes a member of the company's executive staff with headquarters in Richmond, Va. Under the new organization, Beck's department will assist and support marketing activities of the company's six manufacturing divisions.

KISER

BECK

W. J. McCune, general manager of sales for the Sharon Steel Corporation, announced recently the consolidation of the East Coast sales offices, now in New York and Philadelphia, into one Eastern Regional sales office in New York City. **Thomas M. Galbreath** has been named eastern manager of sales. This Eastern Regional sales office is being established in order to provide better service to customers and to center the responsibilities for these services. At the same time, McCune announced the promotions of **Edwin A. Wylde, Edward G. Davis,** and **George L. McCaffrey** to new positions within the sales organization.

Two additional promotions in the sales organization of International Paper Company's container division were announced recently by Arthur B. Damon, division manager.

Kenneth M. Shubert has been named assistant sales manager at the division's Whippany, New Jersey, plant. He was formerly a salesman in the New York Metropolitan area.

Also, **Thomas E. Bliss** has been appointed assistant sales manager at the division's Geneva, New York, plant. Bliss had been a salesman in the New York-New Jersey area.

Lawrence Allison, Dallas, Texas, specialist in manufacturing methods for high-speed aircraft and guided missiles, has joined the staff of The Cyril Bath Company, Solon, Ohio, Cyril Bath, president of the company, announced recently.

James McDonnell, general manager of Ainsworth-Precision Castings Division of Harsco, announces the appointment of **Forbes Howard** as general sales manager. Ainsworth was recently acquired by the Harsco Corp. of Harrisburg, Pa., and merged with its Precision Castings Co. Division. Howard was formerly with United Carr Fastener Corp., serving in various sales capacities.

The appointment of **Paul Disser** as refrigeration division sales manager for Bohn Aluminum & Brass Corporation, Detroit, Michigan, has been announced by R. C. Aylward, general sales manager.

Disser, a graduate of Indiana University School of Business, joined Bohn in 1949 as a sales representative. In 1954 he was advanced to Indianapolis as district sales manager.

Ridiculous, you say. Delay can't *kill* anyone. It isn't a disease.

Yet last year, of the 250,000 Americans who were cancer's victims, 75,000 died *needlessly*. 75,000!... the populations of cities like Charleston, Santa Monica, or Racine. They might have been saved ... but they put off seeing their doctors until it was too late. Their story is told in our dramatic film "The Other City" ... a film which can save thousands of lives. Perhaps your own.

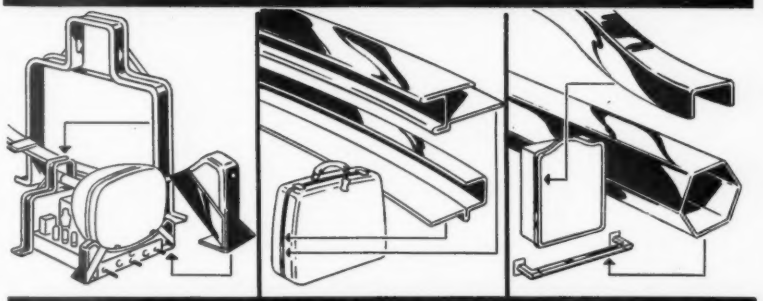
It teaches you the seven danger signals by which early cancer often reveals itself, and emphasizes your need for an annual health checkup as your best insurance against cancer.

"The Other City" is available, without charge, for showing at your church, your club, your community center, plant or office.

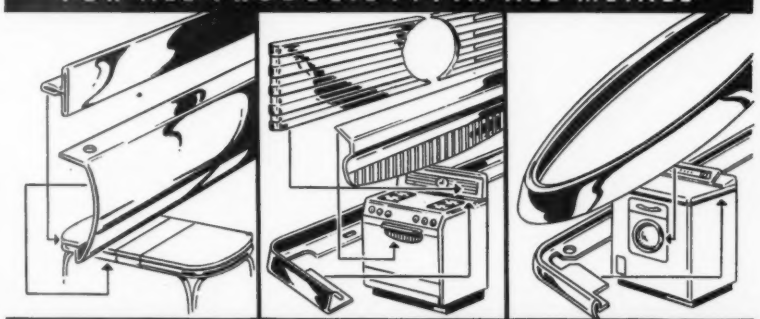
To arrange to see this and other life-saving films, made possible by your contributions, call the Unit of the American Cancer Society in your community or write to "Cancer" in care of your local post office.

AMERICAN CANCER SOCIETY

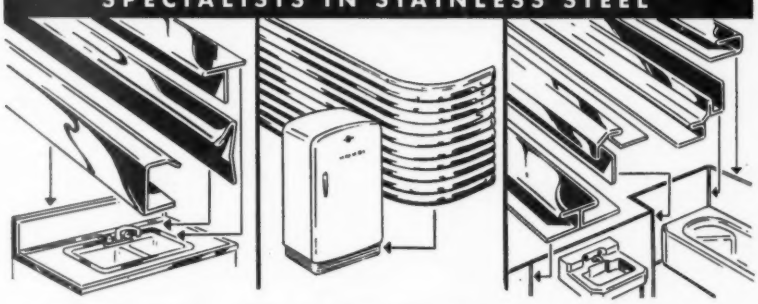
PYRAMID MOULDINGS



FOR ALL PRODUCTS . . . IN ALL METALS



SPECIALISTS IN STAINLESS STEEL



Rings for washers...Bezels for television...Dinette trim and aprons...Refrigerator kick plates and escutcheons...Stove back guard trim—Flue grills... Kitchen Counter Mouldings...Sink Rims...Medicine cabinet frames—Towel Bars...Wallboard Mouldings...Frames for luggage. These are but a few of the many products for which PYRAMID has facilities to design, roll, bend, stamp, buff and assemble both decorative and structural mouldings in any metal. Fast service from complete plants in Chicago and California.

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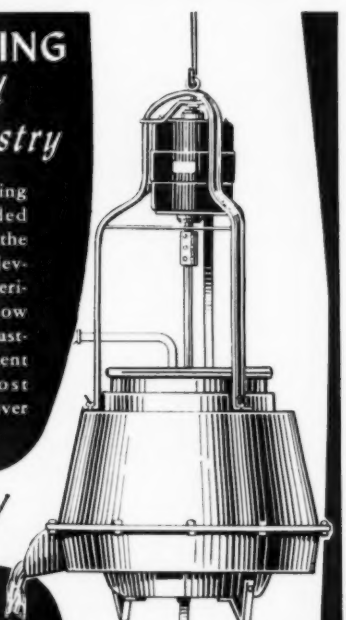

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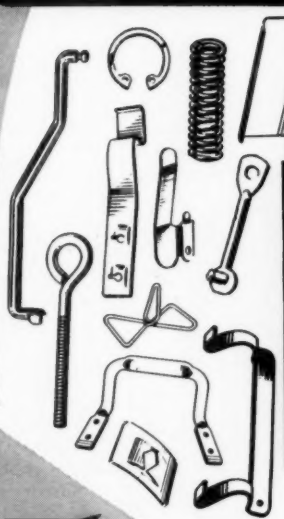
Check today and make sure that you have the correct number and size of Rotospray units in your plant. For additional information contact:

ROTOSPRAY MANUFACTURING CO.
562 WEST WASHINGTON BLVD. • CHICAGO 6, ILLINOIS

SPECIALS
TO YOUR DESIGN



SPRINGS and STAMPINGS
STUD CLIPS
SCREW FASTENERS
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THREADED FORMS
SPECIAL COLD HEADINGS
In all Metals!

Contact your Cuyahoga representative

RIC Republic Industrial Corporation
The CUYAHOGA SPRING *Co.*
10200 BEREA ROAD • CLEVELAND 2, OHIO

Clawson, President of Ferro, Dies

C. Dudley Clawson, president of Ferro Corporation, died Saturday, January 4 from a heart attack while on a trip to Mexico City, Mexico. He had returned from Yucatan and was visiting a subsidiary of Ferro, Ferro Enamel De Mexico, S.A. He was 55. Funeral services were held in Cleveland January 13th. A 27-year veteran of Ferro, Mr. Clawson had been president since 1947. Prior to that he held the post of vice president of sales, and earlier had served two years as managing director of Ferro Enamel (Brazil), S.A., another Ferro subsidiary.

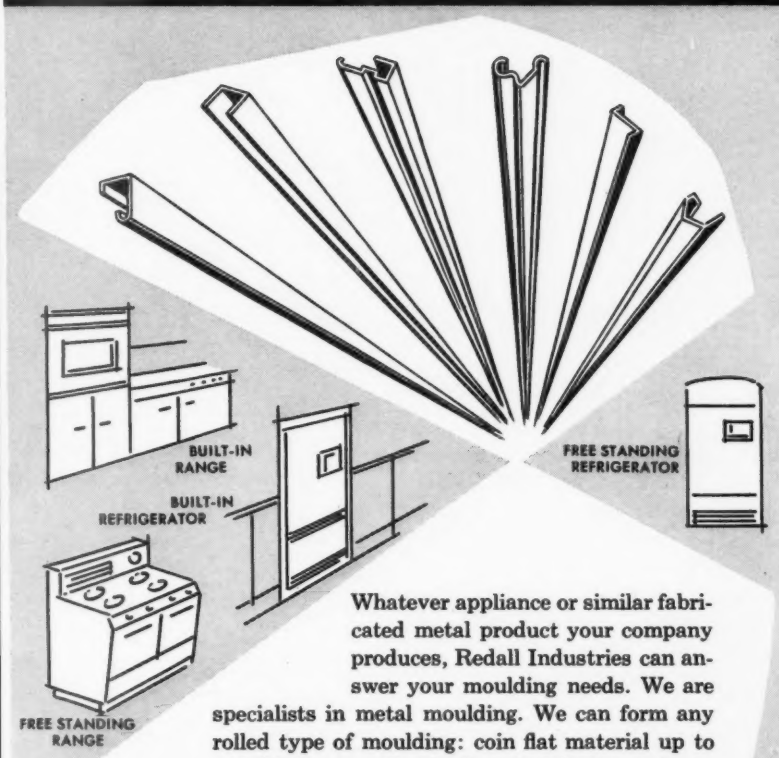
An Ohio State University graduate, Clawson served with a number of Enamel and Appliance companies before joining Ferro. Included were: A-B Stove Co., Republic Metalware, and Chicago Vitreous Corporation. He joined Ferro in 1930 as sales and service engineer.

New Offices for Wolverine

Wolverine Tube, Division of Calumet & Hecla, Inc., has announced the new location of its Administrative and Sales Offices at 17200 Southfield Road, Allen Park, Michigan. The new buildings are now the headquarters for divisional management personnel responsible for the direction of sales, finance, operations, purchasing, industrial and public relations, and their staffs. Plant personnel responsible for Detroit plant purchasing, engineering, production and related plant operations will remain at the offices located at 1411 Central Avenue, Detroit, Michigan.

More news on Page 90

metal mouldings of QUALITY for appliances of MODERN DESIGN



Whatever appliance or similar fabricated metal product your company produces, Redall Industries can answer your moulding needs. We are specialists in metal moulding. We can form any rolled type of moulding: coin flat material up to 1/16" thickness, roll coined material into sections, and roll patterns on metal. We have a wide variety of production mouldings to choose from or we can meet your requirements for custom designs.

In addition to having complete facilities for the production of metal mouldings Redall Industries provides facilities for assembly work, light stamping, and tool and die work.

Write today for complete information

PRODUCTION AND CUSTOM MOULDINGS OF ALL TYPES

Redall Industries
LEXINGTON 1, MICHIGAN

safe transit

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DANA CHASE PUBLICATIONS
York Street at Park Avenue
Elmhurst, Illinois

editorial voice of the national safe transit program

devoted to improving packaging methods and shipping and materials handling methods for the appliance and metal products manufacturing industries. This section contains plant experience information and industry advances for the use of all executives and plant men interested in improving packaging and shipping methods and in loss prevention. The section contains complete information on the national safe transit pre-shipment testing program for packaged finished products and detailed reports of divisions and sub-committees of the National Safe Transit Committee.

NST New York survey report

Following the National Safe Transit Chicago Survey reported in the January issue of MPM, R. F. Bisbee, general chairman of NST and William M. Wilkinson, administrative coordinator in the Washington office conducted a similar survey in New York City.

Seven certified companies and two laboratories were visited. The certified companies included: Ace Utilities, Cole Steel Co., Davidson Corp., New York Lumber and Panel Co., Esquire Radio, Fedders-Quigan, Welbilt Corp. The certified laboratories were: Container Laboratory Inc.,Robert Gair Paper Products Group. The Bisbee-Wilkinson report shows survey findings similar to those reported from Chicago.

Reaction to expansion plans for N.S.T. was favorable and there was a decided interest in a continuation of educational services to certified companies.

As in the Chicago area the manufacturers were unaware, for the most part, of *all* the advantages that can accrue to manufacturers through the use of the NST program as recommended and the use of the label on product containers.

Again, as in Chicago, the proposal to consider the use of an imprinted label was well received, assuming that the test program to be conducted with a large manufacturer proves successful.

The committee was encouraged to step up the activity in the certified laboratory group and to make use of the questionnaire method to coordinate the activity.

It was learned that through the work of one of the leading laboratories the NST program was featured in the packaging school of New York University.

Fedders-Quigan Corporation was one company to report that they were enjoying *all six* of the benefits listed for participation in the voluntary, cooperative program.

One certified company was particularly vocal as to the importance of the label in advising carriers and carrier personnel of the manufacturers efforts to "do their part" in getting the packaged product delivered safely.

The NST Washington office reports that both Mr. Bisbee and Mr. Wilkinson will be making additional field contacts in the near future to assist in solidifying future NST policy and to extend the educational work related to the program.

Color Sound Slides on Nine Case Histories

A color sound slidefilm titled, "Simple Arithmetic In Packaging," on the subject of corrugated bulk containers, has been completed by Gaylord Container Corporation, Division of Crown Zellerbach Corporation. Based on nine case-histories, the film documents the saving in materials handling and packaging made possible by corrugated bulk containers of various types.

A showing of the film can be arranged by writing Advertising Department, Gaylord Container Corporation, Division of Crown Zellerbach Corporation, 111 North Fourth Street, St. Louis 2, Missouri.

New Color-Sound Film Released

The first public showing of the new Safe Transit film, *A Blindfold Removed* was held November 10 at the Coliseum in New York City

Emphasizing benefits derived through participation in the NST Program, *A Blindfold Removed* presents the NST Story in just thirteen action-packed minutes. Not too technical, yet fully factual, it has been slanted toward interests common to both manufacturer and carrier.

Six Safe Transit Benefits

1. *Reduced Product Losses in Transit*
2. *Reduced Packaging Costs*
3. *Better Quality Control*
4. *A Tool for Design Engineering*
5. *Improved Carrier, Distributor and Dealer Relations*
6. *A Vital Sales Aid*

THE BIG THREE

OF THE WATKINS CONTAINER FAMILY

LOOK FOR THIS
CUSTOM PROTECTION
SYMBOL OF QUALITY

Look for this "CW" symbol of QUALITY PROTECTION

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LEWISBURG CONTAINER CO.
243 Singer Street, Lewisburg, Ohio

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P. O. Box 546, Wichita, Kansas

UTILITY CRATE CORPORATION
2019 Imperial Street, Los Angeles 21, California

NEW

WATKINS DUST-FREE E-Z LOAD CONTAINER

- Double, interlocking lip keeps out dust and dirt. Strong enough for fully loaded containers to be lifted by the lip.
- Flush surface of the lip makes it easy to slide containers side by side.
- Wood reinforced for greater protection.
- Perfect for reuse. Remove top for modification or any reason, then replace.

THE STANDARD OF THE SHIPPING INDUSTRY

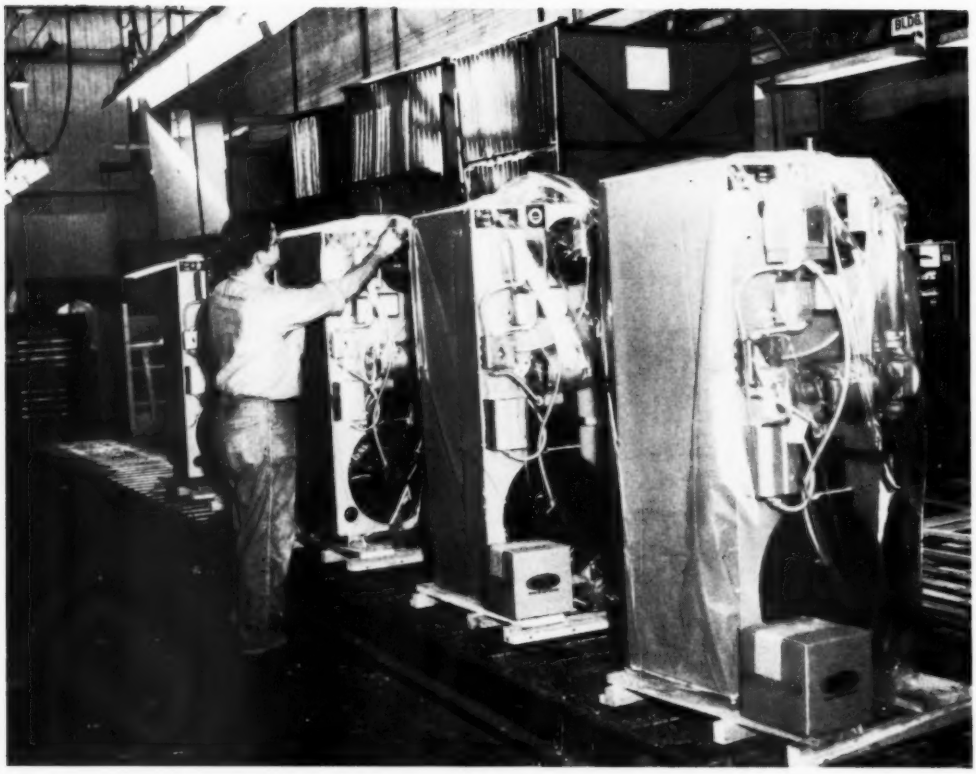
- High stacking strength under all conditions.
- Wood strips laminated to corrugated paper.

THE WATKINS CONTAINER MANUFACTURERS

NEW

WATKINS SMOOTH CONTAINER WITH HUMIDITY CONTROL

- Wood reinforced corrugated paper fits in each corner, gives rigidity for stacking. Never any settling regardless of humidity.
- Wood covered with corrugated paper, no possibility of scratching or marring the contents.
- Smooth, unbroken surfaces for your advertising, trade-mark, or sales message.



Plastic bags for protection against dirt and moisture are slipped over Arcoleader oil-fired heating units before they are packed for shipment from the Bond Plant of the American-Standard Plumbing and Heating Division at Buffalo, N.Y. Glued to the crate bases are containers holding minor accessories.

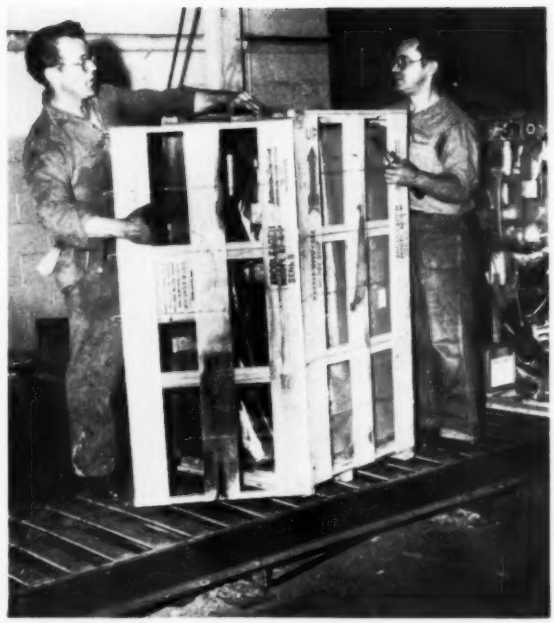
Packaging and shipping completely-assembled oil heating units

THE Plumbing and and Heating Division of American Radiator & Standard Sanitary Corp. thinks so highly of its method of packing its Arcoleader oil-fired heating units for shipment that it devotes space to it in an advertising brochure.

In an Arcoleader advertising brochure for Models A1-3-P and A1-4-P, the company states under the heading *"The Arcoleader oil heating unit is packaged for fast, low-cost installation:"*

"1. The Arcoleader Packaged Oil Heating Unit is assembled and crated at the factory. All controls, most accessories, and the tankless water heater are mounted and the jacket is installed prior to shipment.

"2. Two men can easily remove the Arcoleader from the shipping crate. Compact design and lightweight construction of boiler permit handling by one man in an emergency. Note



With the heating unit held to the base of its crate with hold-down hooks, and the crate top in position, the one-piece wirebound wrap-around blank that comprises the four sides of the shipping container is placed in position and folded about the unit.

how the crate protects the unit, yet simplifies handling and speeds up installation."

The added cost of assembling and crating the heaters at the big American-Standard Bond Plant in Buffalo, N.Y., is more than offset by savings that accrue to installers, the company states.

Assembly at the factory

Careful engineering of the crates for these units had resulted in some reductions in packing costs. When heating units are shipped unassembled, the heavy cast iron boiler sections must be crated, and various fittings, attachments, and accessories must be packed in individual packages. Receivers of such units must unpack the various parts and then assemble and connect the heaters, an operation that requires hours of labor.

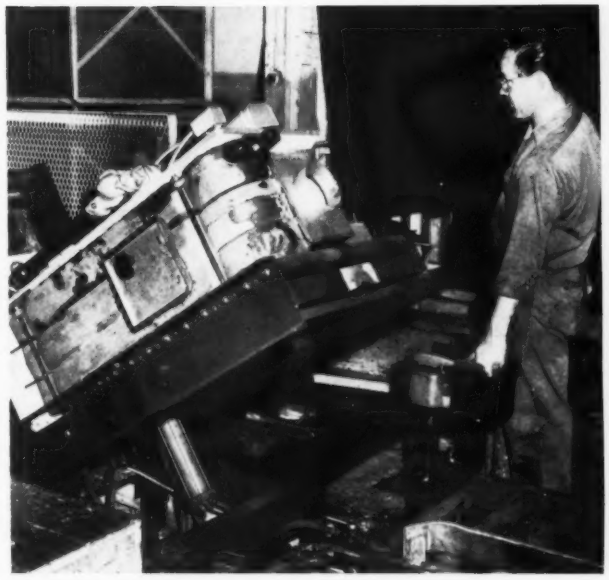
Units are now shipped completely assembled, even to exterior jackets, except for minor accessories contained in a small package glued to the base of the wirebound crate and the Arcoflame Oil Burner, which is in a separate package that accompanies the crated unit.

Less than one hour for assembly at installation

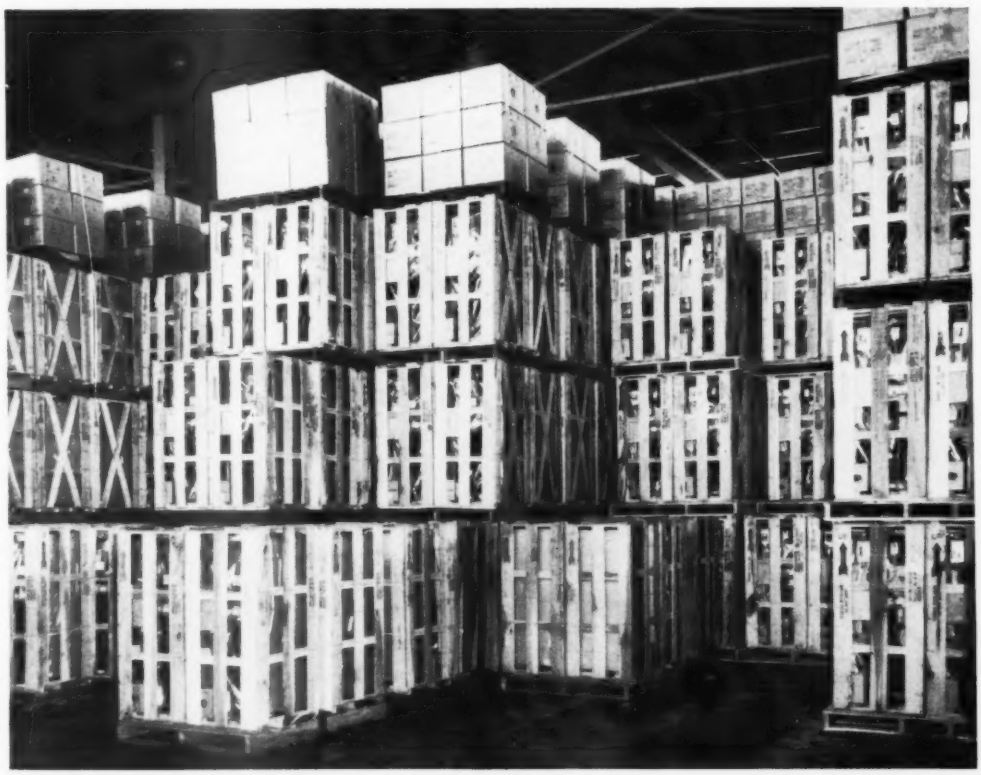
Controls and accessories are wired to the junction box at the factory. The piping, thermostat wiring, and circulator pump are installed. Complete installation of a packaged Arcoleader oil-fired heating unit takes less than an hour, a pronounced economy for installing contractors or dealers.

The 24-inch width of the crate for the 20-inch wide Models A1-3-P and A1-4-P units permits a crated unit to be moved safely through an ordinary basement or utility room for unpacking at the installation site, decreasing the hazard of damage to either the unit or to doorways.

Packed ready for shipment, the Model A1-3-P Arcoleader has a gross shipping weight of 673 pounds. Gross shipping weight of the Model A1-4-P is 824 pounds. However, crated units are stacked safely three high on pallets in the company's shipping room with a pallet load of oil burners placed atop each stack.



An air-activated tilting section of a conveyor in the packing room of the Bond Plant lifts an Arcoleader unit to an upright position after it has been secured to the base of its crate by hold-down hooks. The unit is almost completely assembled. Its outer jacket next will be placed in position.



The gross shipping weight of each of these Model A1-4-P units is 824 pounds, yet pallets loaded with them are stacked three high in the warehouse. Atop each three-high stack of ready-to-ship Arcoleader units is a pallet loaded with oil burners for the units.

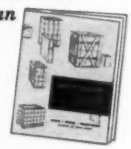
How Much Is hidden damage Costing You In Cash, Time, Trouble And Good Will?

You can't afford to play hide and seek with damage! Just imagine the total time loss resulting from delivery of a damaged product . . . the additional complications and costs and, most of all, the loss of your customer's good will. These are all very real factors in your total packing, handling and shipping costs . . . factors that can't be ignored on the balance sheet.

You can eliminate embarrassment and expense by packing your product in a tough, protective "see through" Wirebound Crate that allows fast, easy inspection at any time. Investigate Wirebounds for lower cost, safe packing, handling and shipping. Write for the informative booklet "What to Expect From Wirebounds," or ask for a sales engineer to call.

Product visibility eliminates Hidden Damage.

Write for the Book or the Man



Wirebound BOXES & CRATES

WIREBOUND BOX MANUFACTURERS ASSOCIATION
Room 1154 • 327 South La Salle St.
Chicago 4, Illinois

Solenoids → *from Page 30*

solenoid for a specific application.

The following procedure is suggested in connection with the use of the curves:

1. Establish the load characteristics for the various positions of the stroke. Plotting the load values on the pull curve will then establish the size solenoid required.
2. Determine the duty requirements for the unit's total "on" time during the complete cycle.
3. Determine the ambient temperature in which the solenoid operated.
4. Refer to the temperature curve for the same size solenoid and check the temperature rise for the total length of time the unit is energized. If the temperature is below 65°C. rise, and if this value added to the ambient temperature does not exceed 105°C., acceptable performance may be expected.
5. If the preceding temperature limits are exceeded, a lower temperature curve should be selected to meet the required conditions. Spring load characteristics may either be revised to match the pull curve, or a larger solenoid specified.
6. Following the selection of the solenoid for the load and duty requirements, all conditions such as mounting, plunger connection, and environmental effects must be taken into consideration.

Due to the fact that the conditions of application must necessarily govern the final selection of the solenoid, acceptable performance in use must be established by actual tests on the appliance. Here are two examples:

1. A severe pull test consists of subjecting the solenoid to gradually increasing voltage. If the unit operates at about 80 to 90 V, ample power is available.
2. A temperature test meeting Underwriters' requirements should be conducted with the machine in operation. Temperature rise and maximum temperature must be within the specified limits.

Since the early applications of solenoids to appliances, there have been many advances in materials and manufacturing techniques. These include improved wire, the use of Class B insulation, vacuum and pressure impregnation, high frequency and voltage "short turn" testing, molded bobbins, encapsulated coils, and multi-point seating of the plunger.

All improvements lead to more practical and economical applications for appliances, but proper selection and use of correct procedures for testing remain equally important from the standpoint of appliance manufacturers. End.

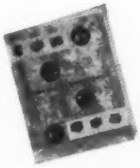
"A TRIED AND TRUE COST SAVER!"

"A TRIED AND TRUE COST SAVINGS FEATURE" says Marvin Ratner, Vice-President, Rentar Packaging Co., Inc., about Chicago Mill Containers.

"As independent export packagers of appliances for General Electric Co. and other leading manufacturers, we cannot risk costly damage claims. Shipping for export calls for extreme care in packaging. We must have sturdy, light weight containers to cut handling and shipping costs and guard against damage claims.

That's why we rely on CHICAGO MILL'S NATIONAL SAFE TRANSIT TESTED CONTAINERS to help us keep costs down in so many ways."

One of Rentar's Operations at 52-01 Flushing Ave., Maspeth 78, New York.



FREE! Illustrated Catalog describing CHICAGO MILL Containers!

Large or Small — Chicago Mill Makes 'Em All. A Complete Line of Containers for Every Shipping Purpose!

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- ROCKMART, GEORGIA
- TALLULAH, LOUISIANA

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CLASSIFIED

HELP WANTED

Ceramic engineer wanted to take charge of control and development work in a progressive porcelain enamel plant specializing in architectural and industrial enameling. Interesting and diversified work in a clean plant. Enameling experience preferred but not necessary. Write experience and qualifications.

Box 2-A, Dana Chase Publications, York St. at Park Ave., Elmhurst, Ill.

REPRESENTATIVE WANTED

Leading manufacturer of complete finishing systems including spray washers, drying ovens, dip tanks, flow coat machines, paint bake ovens, conveyors and allied equipment has territories available for sales representatives with know-how. Commission basis.

The Spra-Con Co., 3600 Elston Ave., Chicago 18, Ill.

SUPPLIER NEWS

→ *from Page 83*

Binks Holds First Annual Service Award Dinner

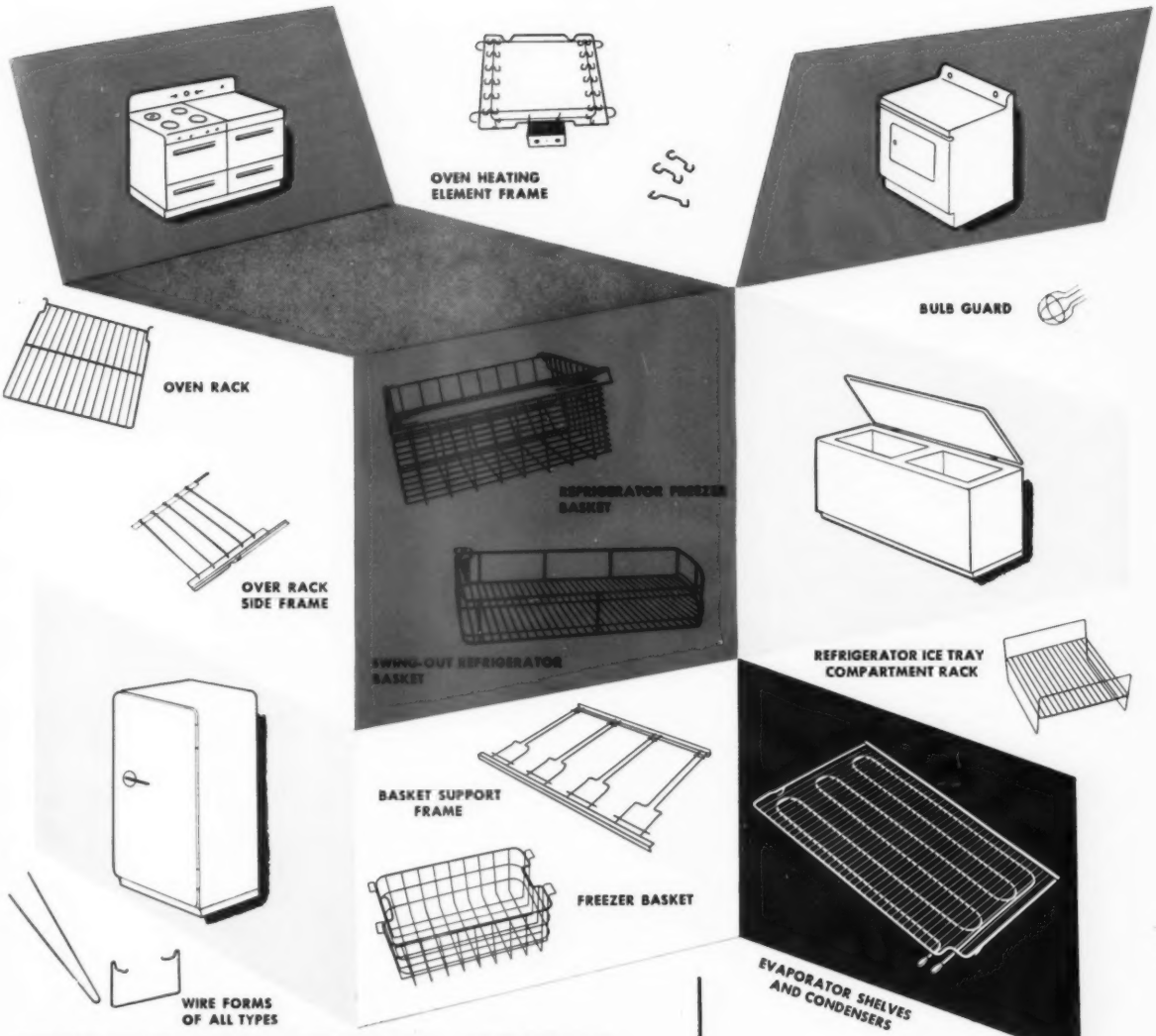
More than 300 employees of the Binks Manufacturing Co., Chicago, attended the company's first Annual Service Award Dinner held recently at a Chicago hotel.

All employees having five or more years of service with the company were invited to the dinner. Employees received gold medallions inscribed with their names. Of these employees, 29 wore special boutonnieres signifying 25 or more years of service.

Burke B. Roche (right), Binks president, presents diamond-jeweled gold service medallion to Chester R. Kranz, who has been with the firm 45 years. Looking on (left to right) are Carl J. Braun, 34 years service, and William F. Stasch with 40 years.

REPRINTS AVAILABLE

A STUDY OF THE CHARACTERISTICS OF ANODIZED ALUMINUM ALLOYS by R. V. Vanden Berg, Aluminum Company of America. Six pages — black and white. Covers a wide variety of surface treatments available for aluminum, and the many finish characteristics. 25¢ per copy.



THIS IS FOR MEN...

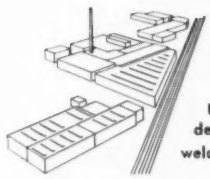
...Who are interested in the design, engineering and construction of modern appliances

Your product—your appliance *needs* wire. For modern wire is the preferred material because of its styling versatility, its strength, its lasting beauty and sound dependability. Wire—welded in the desired shape and size, plated in the finish desired, is basically essential to the appeal, the sale and the continuous satisfaction of your appliance.

Why not improve your appliance and eliminate production problems by selecting the one manufacturer who has specialized in producing quality welded wire products for half a century. Specify Union Steel...the *experienced* source that guarantees higher quality—plus on time delivery.

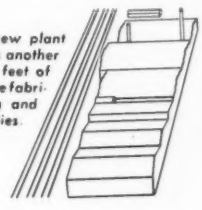
Need help? Union Steel's engineers will gladly assist you in planning and producing a welded wire part or assembly that will make your product more efficient.

Why not start by phoning Union Steel today?



385,000 square feet of modern plant facilities devoted to contract welded wire fabrication

USP EXPANDS AGAIN... TO SERVE YOU BETTER *



* *Union Steel's new plant which provides another 84,000 square feet of specialized wire fabricating, plating and shipping facilities.*

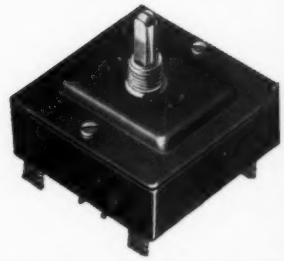
UNION STEEL PRODUCTS CO. ALBION, MICHIGAN

WIRE PRODUCTS DIVISION

TEP

Acquires

SERIES 3000 SWITCH BUSINESS FROM...TUTTLE & KIFT, INC.



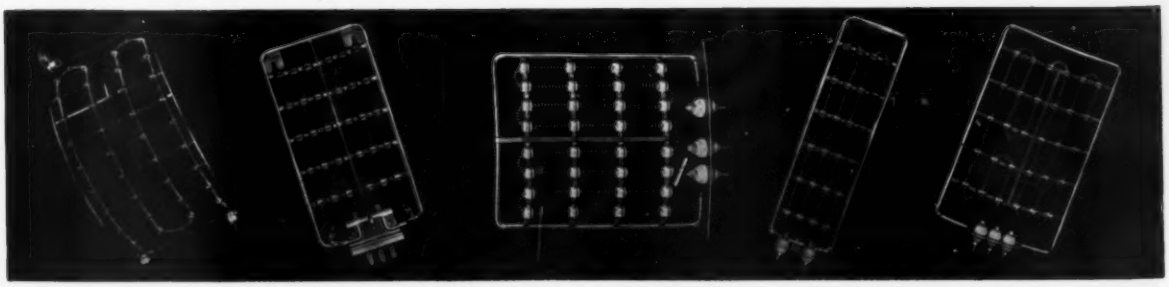
Series 3000 Rotary Snap-Type 3-5-7 Heat Selector Switch now manufactured by "TEP" features trouble-free, positive contact action plus attractive styling for extra "buy appeal." Available with different shafts and handles to suit your needs.

We are pleased to announce that Tuttle Electric Products, Inc. has recently acquired manufacturing and sales rights covering the Series 3000 rotary snap-type selector switches formerly produced by Tuttle & Kift, Inc. for electric ranges, room air conditioners, space heaters, etc. This will mean an expansion in "TEP" designing, engineering, and manufacturing services to the appliance industry and, in effect, will result in our being able to render a better, more complete service to our customers. Transfer of records to our factory and offices in Kirkland, Illinois, has now been completed.

The design and manufacture of "TEP" Open Coil Heating Elements will, of course, continue to be a major part of our business. In the manufacture of Series 3000 switches, as with heating elements, our efforts will be constantly directed towards improvements in design and the maintenance of rigid quality control standards.

I believe you will find our efforts in the switch field will also merit your continued support and good will.

D. V. Tuttle

PRESIDENT

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